MOUSSAIF XT

KERNEL MODEL + HYPERHARNESS

GLOBAL ENGINEERING RESEARCH ATLAS

A canonical 450-page map of the MOUSSAIF XT kernel model, L00-L11 layers, 30-agent swarm, 23 services, 32 mechanisms, training, security, deployment and evaluation.

COVERAGE

- 12 layers / 96 pages
- 30 agents / 150 pages
- 23 services / 92 pages
- 32 mechanisms / 64 pages
- 34 synthesis and roadmap pages

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Proposed research engineering. Reported figures require reproducible benchmark and independent validation.

Scope, Canonical Boundary and Epistemic Status

PURPOSE

This atlas isolates the MOUSSAIF XT kernel model and runtime from the broader AGI theory portfolio. It converts reported architecture into testable layer, agent, service and mechanism dossiers. XT atlas interpretation: purpose is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

MODEL BOUNDARY

Target active B≈96 / total T≈1.2T is treated as a sparse-scaling hypothesis, not as proof of existing trained weights. Research discipline: model boundary advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

ENGINEERING OBJECTIVE

Every component must expose a typed object, service owner, failure behavior, benchmark, rollback and evidence status. XT atlas interpretation: engineering objective is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

المشروع proposed kernel engineering؛ لا نخلط مع source-reported figures independently validated results.

EVIDENCE BOUNDARY

Source artifacts describe vNext4, a 30-agent swarm, 406.74 MB substrate and deployment components. These are artifact-reported unless independently benchmarked. Research discipline: evidence boundary advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

CANONICAL CHAIN

CONSTITUTION -> GOAL -> MCD/FATTAH -> KNOWLEDGE -> SKILLS -> LOOPS -> AGENTS -> TOOLS -> WORLD EFFECT -> MEMORY/LEARNING. Research discipline: canonical chain advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

USE

Use the atlas for implementation planning, gap audit, technical collaboration, benchmark design and publication decomposition. Engineering discipline: use carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

OPERATIONAL EVIDENCE MATRIX XT-GOV

Trigger	Name the condition that activates XT-GOV; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Scope, Canonical Boundary and Epistemic Status.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Master Contents and Page Architecture

I - KERNEL MAP

pp. 004-014: lineage, model boundary, layers, kernels, cognition, substrate, swarm, security, training and deployment. XT atlas interpretation: i - kernel map is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

III - A01-A30

pp. 111-260: five dossiers per agent - mission, I/O, orchestration, failure and promotion. Research discipline: iii - a01-a30 advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

V - 32 MECHANISMS

pp. 353-416: theory plus falsification for each core mechanism. Research discipline: v - 32 mechanisms advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

الكتاب يصف kernel/runtime system وليس مجرد product guide.

II - L00-L11

pp. 015-110: eight dossiers per layer - thesis, schemas, runtime, interfaces, security, failures, benchmarks and roadmap. XT atlas interpretation: ii - l00-l11 is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

IV - 23 SERVICES

pp. 261-352: four dossiers per service - contract, state, security and deployment. Research discipline: iv - 23 services advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

VI - SYNTHESIS

pp. 417-450: model, training, deployment, security, benchmarks, gaps, roadmap and constitution. XT atlas interpretation: vi - synthesis is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX XT-TOC

Trigger	Name the condition that activates XT-TOC; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Master Contents and Page Architecture.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
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Global XT Kernel Architecture

CONTROL PLANE

L00-L02: constitution, goals, governing question, MCD, FATTAH and routing. Engineering discipline: control plane carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

CAPABILITY PLANE

L05-L08: HyperSkills, HyperAbilities, bounded HyperLoops, HyperAgents and mission DAG. Research discipline: capability plane advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

EVOLUTION PLANE

L11: stratified memory, observability, replay, skill synthesis and governed LoRA/SFT/DPO. Engineering discipline: evolution plane carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

من constitution إلى world effect ثم learning، مع authority وevidence في كل transition.

KNOWLEDGE PLANE

L03-L04: FTS5/BM25, vectors, RRF, GraphRAG, context genome and capsules. XT atlas interpretation: knowledge plane is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

EFFECT PLANE

L09-L10: host adapters, MCP, REST, CLI, tools, courts and world-effect closure. XT atlas interpretation: effect plane is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

DEPLOYMENT PLANE

23 services, five-kernel adapters, Docker/VPS, telemetry, health, recovery and audit. XT atlas interpretation: deployment plane is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX XT-GLOBAL

Trigger	Name the condition that activates XT-GLOBAL; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Global XT Kernel Architecture.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
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MOUSSAIF XT Lineage and Canonical Boundary

FAMILY THESIS

MOUSSAIXT, MOUSSAIF XT, XT vNext, vNEXT-2/v7.0, XT vNext4, Sovereign Edition, Enterprise Autonomous Agentic OS and Commercial Master Edition form a lineage. The atlas treats vNext4 artifacts as engineering sources while preserving earlier names for provenance. Research discipline: family thesis advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BOUNDARY

Separate core kernel, runtime extension, application agent, reported artifact and future target. Research discipline: boundary advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

INTEGRATION

Map dependencies across L00-L11, A01-A30, xt-* services and M01-M32 mechanisms. Engineering discipline: integration carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الـlineage محفوظ، لكن كل version يحتاج artifact وbenchmark وstatus مستقل.

OPERATIONAL OBJECT

Define the schema, code artifact, service, benchmark and evidence status represented by this family. Engineering discipline: operational object carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

ABLATION

Remove the family under matched conditions and measure capability, cost, safety and recovery. XT atlas interpretation: ablation is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

NEXT EVIDENCE

Publish runnable configuration, benchmark, traces, negative cases and residual gaps. Engineering discipline: next evidence carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

OPERATIONAL EVIDENCE MATRIX

XT-FAMILY

Trigger	Name the condition that activates XT-FAMILY; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by MOUSSAIF XT Lineage and Canonical Boundary.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Kernel Model versus Agentic Operating System

FAMILY THESIS

The kernel model is the compact constitutional, routing, memory and verification core. The Agentic OS is the broader composition of services, agents, tools, knowledge and deployment. HyperHarness connects both without equating a large software package with a trained foundation model. Research discipline: family thesis advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BOUNDARY

Separate core kernel, runtime extension, application agent, reported artifact and future target. Research discipline: boundary advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

INTEGRATION

Map dependencies across L00-L11, A01-A30, xt-* services and M01-M32 mechanisms. Engineering discipline: integration carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الـKernel ليس هو حجم الملفات؛ إنه أصغر set من invariants وcontracts التي تنظم التنفيذ.

OPERATIONAL OBJECT

Define the schema, code artifact, service, benchmark and evidence status represented by this family. Engineering discipline: operational object carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

ABLATION

Remove the family under matched conditions and measure capability, cost, safety and recovery. XT atlas interpretation: ablation is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

NEXT EVIDENCE

Publish runnable configuration, benchmark, traces, negative cases and residual gaps. Engineering discipline: next evidence carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

OPERATIONAL EVIDENCE MATRIX

XT-FAMILY

Trigger	Name the condition that activates XT-FAMILY; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Kernel Model versus Agentic Operating System.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Twelve-Layer L00-L11 Architecture

FAMILY THESIS

L00-L11 progress from constitution and goals through cognition, knowledge, skills, abilities, loops, agents, adapters, world effect and learning. Every layer owns a typed object and may be independently disabled or ablated. Engineering discipline: family thesis carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

BOUNDARY

Separate core kernel, runtime extension, application agent, reported artifact and future target. Engineering discipline: boundary carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

INTEGRATION

Map dependencies across L00-L11, A01-A30, xt-* services and M01-M32 mechanisms. XT atlas interpretation: integration is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

كل Layer يجب أن يضيف causal value قابلا للقياس، لا مجرد اسم architectural.

OPERATIONAL OBJECT

Define the schema, code artifact, service, benchmark and evidence status represented by this family. XT atlas interpretation: operational object is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

ABLATION

Remove the family under matched conditions and measure capability, cost, safety and recovery. Research discipline: ablation advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT EVIDENCE

Publish runnable configuration, benchmark, traces, negative cases and residual gaps. XT atlas interpretation: next evidence is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX

XT-FAMILY

Trigger	Name the condition that activates XT-FAMILY; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Twelve-Layer L00-L11 Architecture.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Five-Kernel Mesh and Model Portfolio

FAMILY THESIS

K1-Hermes, K2-OpenCode, K3-Codex, K4-Claude and K5-Antigravity are reported as a routed mesh. Names indicate intended adapters, not guaranteed simultaneous availability. The research question is whether portfolio diversity improves reliability under matched cost. Engineering discipline: family thesis carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

BOUNDARY

Separate core kernel, runtime extension, application agent, reported artifact and future target. Engineering discipline: boundary carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

INTEGRATION

Map dependencies across L00-L11, A01-A30, xt-* services and M01-M32 mechanisms. XT atlas interpretation: integration is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

five-kernel mesh يبقى proposed portfolio حتى تثبت availability وtransfer وcorrelated-failure tests.

OPERATIONAL OBJECT

Define the schema, code artifact, service, benchmark and evidence status represented by this family. XT atlas interpretation: operational object is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

ABLATION

Remove the family under matched conditions and measure capability, cost, safety and recovery. Research discipline: ablation advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT EVIDENCE

Publish runnable configuration, benchmark, traces, negative cases and residual gaps. XT atlas interpretation: next evidence is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX

XT-FAMILY

Trigger	Name the condition that activates XT-FAMILY; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Five-Kernel Mesh and Model Portfolio.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
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FATTAH, MCD and Cognitive Routing

FAMILY THESIS

FATTAH structures recursive reasoning; MCD selects decision-relevant causal differences; Q-MCD governs the question; OmniRoute and Sparse HyperRouting allocate capability. Together they form the cognitive control plane. Research discipline: family thesis advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BOUNDARY

Separate core kernel, runtime extension, application agent, reported artifact and future target. Research discipline: boundary advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

INTEGRATION

Map dependencies across L00-L11, A01-A30, xt-* services and M01-M32 mechanisms. Engineering discipline: integration carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

القيمة في disciplined routing وevidence gain، وليس في إظهار hidden chain-of-thought.

OPERATIONAL OBJECT

Define the schema, code artifact, service, benchmark and evidence status represented by this family. Engineering discipline: operational object carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

ABLATION

Remove the family under matched conditions and measure capability, cost, safety and recovery. XT atlas interpretation: ablation is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

NEXT EVIDENCE

Publish runnable configuration, benchmark, traces, negative cases and residual gaps. Engineering discipline: next evidence carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

OPERATIONAL EVIDENCE MATRIX

XT-FAMILY

Trigger	Name the condition that activates XT-FAMILY; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by FATTAH, MCD and Cognitive Routing.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Knowledge, Memory and 406.74 MB Substrate

FAMILY THESIS

The vNext4 source reports a 406.74 MB hybrid substrate using SQLite FTS5/BM25, dense vectors and RRF. Exact symbols and semantic concepts use complementary retrieval. Size and sub-millisecond claims remain artifact-reported until benchmarked independently. Engineering discipline: family thesis carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

BOUNDARY

Separate core kernel, runtime extension, application agent, reported artifact and future target. Engineering discipline: boundary carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

INTEGRATION

Map dependencies across L00-L11, A01-A30, xt-* services and M01-M32 mechanisms. XT atlas interpretation: integration is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

الحجم والسرعة reported figures؛ الـatlas يضع benchmark وprovenance قبل اعتبارها requirements validated.

OPERATIONAL OBJECT

Define the schema, code artifact, service, benchmark and evidence status represented by this family. XT atlas interpretation: operational object is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

ABLATION

Remove the family under matched conditions and measure capability, cost, safety and recovery. Research discipline: ablation advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT EVIDENCE

Publish runnable configuration, benchmark, traces, negative cases and residual gaps. XT atlas interpretation: next evidence is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX

XT-FAMILY

Trigger	Name the condition that activates XT-FAMILY; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Knowledge, Memory and 406.74 MB Substrate.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Thirty-Agent Swarm

FAMILY THESIS

Thirty declarative agents cover governance, technical engineering, applied business, media and knowledge. Only a subset is kernel-critical; application agents demonstrate extensibility. All agents require mission contracts, quotas, handoffs and acceptance tests. XT atlas interpretation: family thesis is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

BOUNDARY

Separate core kernel, runtime extension, application agent, reported artifact and future target. XT atlas interpretation: boundary is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

INTEGRATION

Map dependencies across L00-L11, A01-A30, xt-* services and M01-M32 mechanisms. Research discipline: integration advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

الـ30 agents ليسوا دليلا على intelligence بذاته؛ القياس هو coordination gain وverified output.

OPERATIONAL OBJECT

Define the schema, code artifact, service, benchmark and evidence status represented by this family. Research discipline: operational object advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

ABLATION

Remove the family under matched conditions and measure capability, cost, safety and recovery. Engineering discipline: ablation carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

NEXT EVIDENCE

Publish runnable configuration, benchmark, traces, negative cases and residual gaps. Research discipline: next evidence advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

OPERATIONAL EVIDENCE MATRIX

XT-FAMILY

Trigger	Name the condition that activates XT-FAMILY; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Thirty-Agent Swarm.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

T0-T4 Security and World Effect

FAMILY THESIS

T0 reasoning; T1 read/local create; T2 checkpointed reversible mutation; T3 explicit authorization for sensitive external effects; T4 prohibited actions. World-effect closure prevents intent from being mistaken for success. XT atlas interpretation: family thesis is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

BOUNDARY

Separate core kernel, runtime extension, application agent, reported artifact and future target. XT atlas interpretation: boundary is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

INTEGRATION

Map dependencies across L00-L11, A01-A30, xt-* services and M01-M32 mechanisms. Research discipline: integration advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

authorization tier الـ يعاد فحصه عند action time، وT4 يبقى blocked مهما كانت المنفعة المتوقعة.

OPERATIONAL OBJECT

Define the schema, code artifact, service, benchmark and evidence status represented by this family. Research discipline: operational object advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

ABLATION

Remove the family under matched conditions and measure capability, cost, safety and recovery. Engineering discipline: ablation carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

NEXT EVIDENCE

Publish runnable configuration, benchmark, traces, negative cases and residual gaps. Research discipline: next evidence advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

OPERATIONAL EVIDENCE MATRIX

XT-FAMILY

Trigger	Name the condition that activates XT-FAMILY; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by T0-T4 Security and World Effect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Training, Continual Learning and Scaling Claims

FAMILY THESIS

Reported training assets include SFT, DPO and general training JSONL files; LoRA and vLLM form the adaptation and serving path. A proposed active B≈96/total T≈1.2T scaling concept is architectural, not evidence of an existing 1.2T trained model. XT atlas interpretation: family thesis is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

BOUNDARY

Separate core kernel, runtime extension, application agent, reported artifact and future target. XT atlas interpretation: boundary is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

INTEGRATION

Map dependencies across L00-L11, A01-A30, xt-* services and M01-M32 mechanisms. Research discipline: integration advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

نفصل دائما بين target architecture وtrained weights وdeployed benchmark evidence.

OPERATIONAL OBJECT

Define the schema, code artifact, service, benchmark and evidence status represented by this family. Research discipline: operational object advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

ABLATION

Remove the family under matched conditions and measure capability, cost, safety and recovery. Engineering discipline: ablation carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

NEXT EVIDENCE

Publish runnable configuration, benchmark, traces, negative cases and residual gaps. Research discipline: next evidence advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

OPERATIONAL EVIDENCE MATRIX

XT-FAMILY

Trigger	Name the condition that activates XT-FAMILY; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Training, Continual Learning and Scaling Claims.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Sovereign Deployment and Interoperability

FAMILY THESIS

The runtime targets local CLI, MCP, OpenAI-compatible REST :8443, Docker/VPS and framework adapters for LangChain, CrewAI, AutoGen and LlamaIndex. Sovereignty depends on data control, local fallbacks, reproducible configuration and recoverable state. XT atlas interpretation: family thesis is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

BOUNDARY

Separate core kernel, runtime extension, application agent, reported artifact and future target. XT atlas interpretation: boundary is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

INTEGRATION

Map dependencies across L00-L11, A01-A30, xt-* services and M01-M32 mechanisms. Research discipline: integration advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

السيادة تعني control وportability وrecovery، لا مجرد تشغيل ملف محلي.

OPERATIONAL OBJECT

Define the schema, code artifact, service, benchmark and evidence status represented by this family. Research discipline: operational object advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

ABLATION

Remove the family under matched conditions and measure capability, cost, safety and recovery. Engineering discipline: ablation carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

NEXT EVIDENCE

Publish runnable configuration, benchmark, traces, negative cases and residual gaps. Research discipline: next evidence advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

OPERATIONAL EVIDENCE MATRIX

XT-FAMILY

Trigger	Name the condition that activates XT-FAMILY; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Sovereign Deployment and Interoperability.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L00 - Constitution, Identity and T0-T4 Security: Thesis and Boundary

LAYER THESIS

Constitution, Identity and T0-T4 Security owns constitutional precedence, identity, authorization and hard safety boundaries. Its primary artifact is policy decision packet. The layer is part of the proposed L00-L11 MOUSSAIF XT kernel architecture. Layer analysis for L00 - Constitution, Identity and T0-T4 Security: convert layer thesis into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

BOUNDARY

L00 is skipped for tasks where its artifact is unnecessary. It does not by itself prove AGI, safety or consciousness. Governance analysis for L00 - Constitution, Identity and T0-T4 Security: boundary is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

STATUS DISCIPLINE

Specify PROPOSED, PROTOTYPED, CONNECTED, BENCHMARKED or REPLICATED separately. Governance analysis for L00 - Constitution, Identity and T0-T4 Security: status discipline is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L00 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

UNIQUE RESPONSIBILITY

The layer must expose value not already supplied by MCIL, T0-T4, xt-policy-engine. The object changes a route, state, action or verification result. Research analysis for L00 - Constitution, Identity and T0-T4 Security: formulate the null that a simpler kernel without this unique responsibility function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

RESEARCH QUESTIONS

Does L00 improve unauthorized action rate, policy consistency, revocation latency under matched budgets? Does removal reveal a unique causal difference? Governance analysis for L00 - Constitution, Identity and T0-T4 Security: research questions is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

KERNEL ROLE

L00 participates in constitution-to-world-effect closure and remains independently disableable. Research analysis for L00 - Constitution, Identity and T0-T4 Security: formulate the null that a simpler kernel without this kernel role function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX

L00

Trigger	Name the condition that activates L00; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L00 - Constitution, Identity and T0-T4 Security.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L00 - Constitution, Identity and T0-T4 Security: Objects and Schemas

SCHEMAS

Primary schema: policy decision packet; include task, state, version, authority, evidence, postcondition and residual uncertainty. Interface analysis for L00 - Constitution, Identity and T0-T4 Security: schemas declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OUTPUTS

Outputs feed downstream planning, routing, tools, courts, memory or learning according to L00. Interface analysis for L00 - Constitution, Identity and T0-T4 Security: outputs declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

VERSIONING

Schema migration preserves semantic meaning and supports replay of historical traces. Interface analysis for L00 - Constitution, Identity and T0-T4 Security: versioning declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L00 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

INPUTS

Inputs arrive from upstream kernel layers and MCIL, T0-T4, xt-policy-engine; freshness and provenance are mandatory. Layer analysis for L00 - Constitution, Identity and T0-T4 Security: convert inputs into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

INVARIANTS

Observed, inferred, intended, simulated and unknown state remain distinct. No silent privilege escalation. Layer analysis for L00 - Constitution, Identity and T0-T4 Security: convert invariants into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

ARTIFACT TEST

Reject malformed, incomplete, stale, unauthorized or causally inert objects. Governance analysis for L00 - Constitution, Identity and T0-T4 Security: artifact test is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L00

Trigger	Name the condition that activates L00; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L00 - Constitution, Identity and T0-T4 Security.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L00 - Constitution, Identity and T0-T4 Security: Runtime Algorithm

RUNTIME PATH

Trigger -> validate -> retrieve -> transform -> verify -> emit policy decision packet -> reconcile -> ledger. Layer analysis for L00 - Constitution, Identity and T0-T4 Security: convert runtime path into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

BUDGETS

Declare tokens, time, tool calls, loop count and escalation ceiling. Interface analysis for L00 - Constitution, Identity and T0-T4 Security: budgets declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

FALLBACK

Degrade safely when models, knowledge, tools or services are unavailable. Governance analysis for L00 - Constitution, Identity and T0-T4 Security: fallback is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L00 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ROUTING

Load the smallest sufficient model, knowledge, skills and tools for L00. Governance analysis for L00 - Constitution, Identity and T0-T4 Security: routing is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

CONCURRENCY

Define idempotency, conflict, ordering, cancellation and partial-completion semantics. Research analysis for L00 - Constitution, Identity and T0-T4 Security: formulate the null that a simpler kernel without this concurrency function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

STOP CONDITIONS

Stop on success, saturation, budget, risk, revoked authority or failed postcondition. Governance analysis for L00 - Constitution, Identity and T0-T4 Security: stop conditions is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L00

Trigger	Name the condition that activates L00; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L00 - Constitution, Identity and T0-T4 Security.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L00 - Constitution, Identity and T0-T4 Security: Interfaces and Contracts

UPSTREAM INTERFACES

MCIL, T0-T4, xt-policy-engine and prior layer objects provide validated state to L00. Interface analysis for L00 - Constitution, Identity and T0-T4 Security: upstream interfaces declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

SERVICE MAPPING

Map L00 to one or more xt-* services without hiding ownership. Interface analysis for L00 - Constitution, Identity and T0-T4 Security: service mapping declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

PROTOCOL MAPPING

CLI, MCP and REST representations preserve equivalent semantics. Research analysis for L00 - Constitution, Identity and T0-T4 Security: formulate the null that a simpler kernel without this protocol mapping function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L00 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DOWNSTREAM INTERFACES

Consumers receive typed objects, never ambiguous prose-only handoffs. Layer analysis for L00 - Constitution, Identity and T0-T4 Security: convert downstream interfaces into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

AGENT MAPPING

Agents activate the layer through mission contracts, not direct global state mutation. Governance analysis for L00 - Constitution, Identity and T0-T4 Security: agent mapping is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

INTEGRATION TEST

Test missing, duplicate, delayed, conflicting and reordered messages. Layer analysis for L00 - Constitution, Identity and T0-T4 Security: convert integration test into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX — L00

Trigger	Name the condition that activates L00; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L00 - Constitution, Identity and T0-T4 Security.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L00 - Constitution, Identity and T0-T4 Security: Security and Authority

THREAT MODEL

Attack L00 through spoofed state, injection, stale evidence, permission confusion and resource exhaustion. Interface analysis for L00 - Constitution, Identity and T0-T4 Security: threat model declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

DATA CONTROLS

Minimize, scope, encrypt, retain and delete data according to class and purpose. Research analysis for L00 - Constitution, Identity and T0-T4 Security: formulate the null that a simpler kernel without this data controls function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

AUDIT

Log identifiers, decisions and postconditions without exposing secrets. Governance analysis for L00 - Constitution, Identity and T0-T4 Security: audit is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L00 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

AUTHORIZATION

Classify actions T0-T4 and recheck authority at mutation time. Interface analysis for L00 - Constitution, Identity and T0-T4 Security: authorization declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

SANDBOXING

Untrusted execution is isolated with bounded filesystem, process and network capabilities. Interface analysis for L00 - Constitution, Identity and T0-T4 Security: sandboxing declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

SECURITY TESTS

Include malicious payload, revoked credential, path manipulation and recovery. Governance analysis for L00 - Constitution, Identity and T0-T4 Security: security tests is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX — L00

Trigger	Name the condition that activates L00; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L00 - Constitution, Identity and T0-T4 Security.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L00 - Constitution, Identity and T0-T4 Security: Failure and Recovery

FAILURE TAXONOMY

L00 can fail by wrong trigger, invalid object, stale state, dependency error or false success. Interface analysis for L00 - Constitution, Identity and T0-T4 Security: failure taxonomy declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

CONTAINMENT

Stop downstream actions and preserve evidence when critical invariants fail. Research analysis for L00 - Constitution, Identity and T0-T4 Security: formulate the null that a simpler kernel without this containment function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

LEARNING BOUNDARY

A failure trace is not promoted to memory or training until verified and de-identified. Research analysis for L00 - Constitution, Identity and T0-T4 Security: formulate the null that a simpler kernel without this learning boundary function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L00 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DETECTION

Monitor unauthorized action rate, policy consistency, revocation latency, schema validity, drift and unclosed world effects. Interface analysis for L00 - Constitution, Identity and T0-T4 Security: detection declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

RECOVERY

Restore from checkpoint, replay safe state and report residual mutation. Interface analysis for L00 - Constitution, Identity and T0-T4 Security: recovery declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

INCIDENT OUTPUT

Emit root cause hypothesis, evidence, action, recovery and prevention record. Interface analysis for L00 - Constitution, Identity and T0-T4 Security: incident output declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L00

Trigger	Name the condition that activates L00; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L00 - Constitution, Identity and T0-T4 Security.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L00 - Constitution, Identity and T0-T4 Security: Benchmarks and Ablations

BASELINES

Compare prompt-only, monolithic agent and full kernel without this layer. Layer analysis for L00 - Constitution, Identity and T0-T4 Security: convert baselines into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

SCENARIOS

Clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Interface analysis for L00 - Constitution, Identity and T0-T4 Security: scenarios declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

EVIDENCE GRADES

E0 idea through E5 robust independent support; this atlas does not auto-promote. Governance analysis for L00 - Constitution, Identity and T0-T4 Security: evidence grades is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L00 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ABLATIONS

Remove L00, replace it with a simpler rule and vary each dependency. Governance analysis for L00 - Constitution, Identity and T0-T4 Security: ablations is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

METRICS

Primary: unauthorized action rate, policy consistency, revocation latency. Secondary: cost, latency, calibration, safety and recovery. Interface analysis for L00 - Constitution, Identity and T0-T4 Security: metrics declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

REPLICATION

Release schemas, configs, tasks, seeds, traces and negative results where authorized. Layer analysis for L00 - Constitution, Identity and T0-T4 Security: convert replication into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L00

Trigger	Name the condition that activates L00; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L00 - Constitution, Identity and T0-T4 Security.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L00 - Constitution, Identity and T0-T4 Security: Implementation Roadmap

MINIMAL SLICE

Implement the smallest runnable L00 object and connect it to the evidence ledger. Interface analysis for L00 - Constitution, Identity and T0-T4 Security: minimal slice declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

BENCHMARK GATE

Demonstrate improvement in unauthorized action rate, policy consistency, revocation latency under matched conditions. Research analysis for L00 - Constitution, Identity and T0-T4 Security: formulate the null that a simpler kernel without this benchmark gate function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPEN GAPS

Track missing code, simulated telemetry, untested interfaces and unresolved definitions. Governance analysis for L00 - Constitution, Identity and T0-T4 Security: open gaps is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L00 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

CONNECTION GATE

Prove upstream/downstream integration and state reconciliation. Governance analysis for L00 - Constitution, Identity and T0-T4 Security: connection gate is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

PROMOTION GATE

Require security, recovery, transfer and human-authority review. Research analysis for L00 - Constitution, Identity and T0-T4 Security: formulate the null that a simpler kernel without this promotion gate function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

NEXT RELEASE

Promote L00 only when artifact, tests and evidence status agree. Research analysis for L00 - Constitution, Identity and T0-T4 Security: formulate the null that a simpler kernel without this next release function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX — L00

Trigger	Name the condition that activates L00; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L00 - Constitution, Identity and T0-T4 Security.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L01 - Goal Decomposition and Governing Question: Thesis and Boundary

LAYER THESIS

Goal Decomposition and Governing Question owns turning unstructured intent into bounded goals, acceptance tests and the governing question. Its primary artifact is goal contract and mission graph. The layer is part of the proposed L00-L11 MOUSSAIF XT kernel architecture. Research analysis for L01 - Goal Decomposition and Governing Question: formulate the null that a simpler kernel without this layer thesis function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

BOUNDARY

L01 is skipped for tasks where its artifact is unnecessary. It does not by itself prove AGI, safety or consciousness. Interface analysis for L01 - Goal Decomposition and Governing Question: boundary declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

STATUS DISCIPLINE

Specify PROPOSED, PROTOTYPED, CONNECTED, BENCHMARKED or REPLICATED separately. Interface analysis for L01 - Goal Decomposition and Governing Question: status discipline declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L01 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

UNIQUE RESPONSIBILITY

The layer must expose value not already supplied by MGCG, Q-MCD, xt-goal-service. The object changes a route, state, action or verification result. Layer analysis for L01 - Goal Decomposition and Governing Question: convert unique responsibility into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

RESEARCH QUESTIONS

Does L01 improve scope stability, acceptance clarity, rework rate under matched budgets? Does removal reveal a unique causal difference? Interface analysis for L01 - Goal Decomposition and Governing Question: research questions declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

KERNEL ROLE

L01 participates in constitution-to-world-effect closure and remains independently disableable. Layer analysis for L01 - Goal Decomposition and Governing Question: convert kernel role into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L01

Trigger	Name the condition that activates L01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L01 - Goal Decomposition and Governing Question.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L01 - Goal Decomposition and Governing Question: Objects and Schemas

SCHEMAS

Primary schema: goal contract and mission graph; include task, state, version, authority, evidence, postcondition and residual uncertainty. Governance analysis for L01 - Goal Decomposition and Governing Question: schemas is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OUTPUTS

Outputs feed downstream planning, routing, tools, courts, memory or learning according to L01. Governance analysis for L01 - Goal Decomposition and Governing Question: outputs is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

VERSIONING

Schema migration preserves semantic meaning and supports replay of historical traces. Governance analysis for L01 - Goal Decomposition and Governing Question: versioning is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L01 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

INPUTS

Inputs arrive from upstream kernel layers and MGCG, Q-MCD, xt-goal-service; freshness and provenance are mandatory. Research analysis for L01 - Goal Decomposition and Governing Question: formulate the null that a simpler kernel without this inputs function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

INVARIANTS

Observed, inferred, intended, simulated and unknown state remain distinct. No silent privilege escalation. Research analysis for L01 - Goal Decomposition and Governing Question: formulate the null that a simpler kernel without this invariants function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

ARTIFACT TEST

Reject malformed, incomplete, stale, unauthorized or causally inert objects. Interface analysis for L01 - Goal Decomposition and Governing Question: artifact test declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L01

Trigger	Name the condition that activates L01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L01 - Goal Decomposition and Governing Question.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L01 - Goal Decomposition and Governing Question: Runtime Algorithm

RUNTIME PATH

Trigger -> validate -> retrieve -> transform -> verify -> emit goal contract and mission graph -> reconcile -> ledger. Research analysis for L01 - Goal Decomposition and Governing Question: formulate the null that a simpler kernel without this runtime path function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

BUDGETS

Declare tokens, time, tool calls, loop count and escalation ceiling. Governance analysis for L01 - Goal Decomposition and Governing Question: budgets is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

FALLBACK

Degrade safely when models, knowledge, tools or services are unavailable. Interface analysis for L01 - Goal Decomposition and Governing Question: fallback declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L01 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ROUTING

Load the smallest sufficient model, knowledge, skills and tools for L01. Interface analysis for L01 - Goal Decomposition and Governing Question: routing declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

CONCURRENCY

Define idempotency, conflict, ordering, cancellation and partial-completion semantics. Layer analysis for L01 - Goal Decomposition and Governing Question: convert concurrency into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

STOP CONDITIONS

Stop on success, saturation, budget, risk, revoked authority or failed postcondition. Interface analysis for L01 - Goal Decomposition and Governing Question: stop conditions declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L01

Trigger	Name the condition that activates L01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L01 - Goal Decomposition and Governing Question.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L01 - Goal Decomposition and Governing Question: Interfaces and Contracts

UPSTREAM INTERFACES

MGCG, Q-MCD, xt-goal-service and prior layer objects provide validated state to L01. Governance analysis for L01 - Goal Decomposition and Governing Question: upstream interfaces is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

SERVICE MAPPING

Map L01 to one or more xt-* services without hiding ownership. Governance analysis for L01 - Goal Decomposition and Governing Question: service mapping is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

PROTOCOL MAPPING

CLI, MCP and REST representations preserve equivalent semantics. Layer analysis for L01 - Goal Decomposition and Governing Question: convert protocol mapping into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L01 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DOWNSTREAM INTERFACES

Consumers receive typed objects, never ambiguous prose-only handoffs. Research analysis for L01 - Goal Decomposition and Governing Question: formulate the null that a simpler kernel without this downstream interfaces function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

AGENT MAPPING

Agents activate the layer through mission contracts, not direct global state mutation. Interface analysis for L01 - Goal Decomposition and Governing Question: agent mapping declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

INTEGRATION TEST

Test missing, duplicate, delayed, conflicting and reordered messages. Research analysis for L01 - Goal Decomposition and Governing Question: formulate the null that a simpler kernel without this integration test function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX L01

Trigger	Name the condition that activates L01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L01 - Goal Decomposition and Governing Question.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L01 - Goal Decomposition and Governing Question: Security and Authority

THREAT MODEL

Attack L01 through spoofed state, injection, stale evidence, permission confusion and resource exhaustion. Governance analysis for L01 - Goal Decomposition and Governing Question: threat model is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

DATA CONTROLS

Minimize, scope, encrypt, retain and delete data according to class and purpose. Layer analysis for L01 - Goal Decomposition and Governing Question: convert data controls into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

AUDIT

Log identifiers, decisions and postconditions without exposing secrets. Interface analysis for L01 - Goal Decomposition and Governing Question: audit declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L01 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

AUTHORIZATION

Classify actions T0-T4 and recheck authority at mutation time. Governance analysis for L01 - Goal Decomposition and Governing Question: authorization is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

SANDBOXING

Untrusted execution is isolated with bounded filesystem, process and network capabilities. Governance analysis for L01 - Goal Decomposition and Governing Question: sandboxing is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

SECURITY TESTS

Include malicious payload, revoked credential, path manipulation and recovery. Interface analysis for L01 - Goal Decomposition and Governing Question: security tests declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L01

Trigger	Name the condition that activates L01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L01 - Goal Decomposition and Governing Question.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L01 - Goal Decomposition and Governing Question: Failure and Recovery

FAILURE TAXONOMY

L01 can fail by wrong trigger, invalid object, stale state, dependency error or false success. Governance analysis for L01 - Goal Decomposition and Governing Question: failure taxonomy is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

CONTAINMENT

Stop downstream actions and preserve evidence when critical invariants fail. Layer analysis for L01 - Goal Decomposition and Governing Question: convert containment into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

LEARNING BOUNDARY

A failure trace is not promoted to memory or training until verified and de-identified. Layer analysis for L01 - Goal Decomposition and Governing Question: convert learning boundary into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L01 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DETECTION

Monitor scope stability, acceptance clarity, rework rate, schema validity, drift and unclosed world effects. Governance analysis for L01 - Goal Decomposition and Governing Question: detection is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

RECOVERY

Restore from checkpoint, replay safe state and report residual mutation. Governance analysis for L01 - Goal Decomposition and Governing Question: recovery is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

INCIDENT OUTPUT

Emit root cause hypothesis, evidence, action, recovery and prevention record. Governance analysis for L01 - Goal Decomposition and Governing Question: incident output is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L01

Trigger	Name the condition that activates L01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L01 - Goal Decomposition and Governing Question.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L01 - Goal Decomposition and Governing Question: Benchmarks and Ablations

BASELINES

Compare prompt-only, monolithic agent and full kernel without this layer. Research analysis for L01 - Goal Decomposition and Governing Question: formulate the null that a simpler kernel without this baselines function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

SCENARIOS

Clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Governance analysis for L01 - Goal Decomposition and Governing Question: scenarios is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

EVIDENCE GRADES

E0 idea through E5 robust independent support; this atlas does not auto-promote. Interface analysis for L01 - Goal Decomposition and Governing Question: evidence grades declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L01 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ABLATIONS

Remove L01, replace it with a simpler rule and vary each dependency. Interface analysis for L01 - Goal Decomposition and Governing Question: ablations declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

METRICS

Primary: scope stability, acceptance clarity, rework rate. Secondary: cost, latency, calibration, safety and recovery. Governance analysis for L01 - Goal Decomposition and Governing Question: metrics is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

REPLICATION

Release schemas, configs, tasks, seeds, traces and negative results where authorized. Research analysis for L01 - Goal Decomposition and Governing Question: formulate the null that a simpler kernel without this replication function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX

L01

Trigger	Name the condition that activates L01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L01 - Goal Decomposition and Governing Question.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L01 - Goal Decomposition and Governing Question: Implementation Roadmap

MINIMAL SLICE

Implement the smallest runnable L01 object and connect it to the evidence ledger. Governance analysis for L01 - Goal Decomposition and Governing Question: minimal slice is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

BENCHMARK GATE

Demonstrate improvement in scope stability, acceptance clarity, rework rate under matched conditions. Layer analysis for L01 - Goal Decomposition and Governing Question: convert benchmark gate into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPEN GAPS

Track missing code, simulated telemetry, untested interfaces and unresolved definitions. Interface analysis for L01 - Goal Decomposition and Governing Question: open gaps declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L01 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

CONNECTION GATE

Prove upstream/downstream integration and state reconciliation. Interface analysis for L01 - Goal Decomposition and Governing Question: connection gate declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

PROMOTION GATE

Require security, recovery, transfer and human-authority review. Layer analysis for L01 - Goal Decomposition and Governing Question: convert promotion gate into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

NEXT RELEASE

Promote L01 only when artifact, tests and evidence status agree. Layer analysis for L01 - Goal Decomposition and Governing Question: convert next release into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX — L01

Trigger	Name the condition that activates L01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L01 - Goal Decomposition and Governing Question.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L02 - Cognitive Routing, MCD and FATTAH: Thesis and Boundary

LAYER THESIS

Cognitive Routing, MCD and FATTAH owns selecting the active difference, reasoning discipline and compute route. Its primary artifact is cognitive route packet and FATTAH trace. The layer is part of the proposed L00-L11 MOUSSAIF XT kernel architecture. Layer analysis for L02 - Cognitive Routing, MCD and FATTAH: convert layer thesis into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

BOUNDARY

L02 is skipped for tasks where its artifact is unnecessary. It does not by itself prove AGI, safety or consciousness. Governance analysis for L02 - Cognitive Routing, MCD and FATTAH: boundary is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

STATUS DISCIPLINE

Specify PROPOSED, PROTOTYPED, CONNECTED, BENCHMARKED or REPLICATED separately. Governance analysis for L02 - Cognitive Routing, MCD and FATTAH: status discipline is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L02 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

UNIQUE RESPONSIBILITY

The layer must expose value not already supplied by MCD, Q-MCD, FATTAH, xt-mcd-service. The object changes a route, state, action or verification result. Research analysis for L02 - Cognitive Routing, MCD and FATTAH: formulate the null that a simpler kernel without this unique responsibility function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

RESEARCH QUESTIONS

Does L02 improve decision value, route sparsity, reasoning cost under matched budgets? Does removal reveal a unique causal difference? Governance analysis for L02 - Cognitive Routing, MCD and FATTAH: research questions is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

KERNEL ROLE

L02 participates in constitution-to-world-effect closure and remains independently disableable. Research analysis for L02 - Cognitive Routing, MCD and FATTAH: formulate the null that a simpler kernel without this kernel role function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX

L02

Trigger	Name the condition that activates L02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L02 - Cognitive Routing, MCD and FATTAH.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L02 - Cognitive Routing, MCD and FATTAH: Objects and Schemas

SCHEMAS

Primary schema: cognitive route packet and FATTAH trace; include task, state, version, authority, evidence, postcondition and residual uncertainty. Interface analysis for L02 - Cognitive Routing, MCD and FATTAH: schemas declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OUTPUTS

Outputs feed downstream planning, routing, tools, courts, memory or learning according to L02. Interface analysis for L02 - Cognitive Routing, MCD and FATTAH: outputs declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

VERSIONING

Schema migration preserves semantic meaning and supports replay of historical traces. Interface analysis for L02 - Cognitive Routing, MCD and FATTAH: versioning declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L02 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

INPUTS

Inputs arrive from upstream kernel layers and MCD, Q-MCD, FATTAH, xt-mcd-service; freshness and provenance are mandatory. Layer analysis for L02 - Cognitive Routing, MCD and FATTAH: convert inputs into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

INVARIANTS

Observed, inferred, intended, simulated and unknown state remain distinct. No silent privilege escalation. Layer analysis for L02 - Cognitive Routing, MCD and FATTAH: convert invariants into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

ARTIFACT TEST

Reject malformed, incomplete, stale, unauthorized or causally inert objects. Governance analysis for L02 - Cognitive Routing, MCD and FATTAH: artifact test is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX L02

Trigger	Name the condition that activates L02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L02 - Cognitive Routing, MCD and FATTAH.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L02 - Cognitive Routing, MCD and FATTAH: Runtime Algorithm

RUNTIME PATH

Trigger -> validate -> retrieve -> transform -> verify -> emit cognitive route packet and FATTAH trace -> reconcile -> ledger. Layer analysis for L02 - Cognitive Routing, MCD and FATTAH: convert runtime path into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

BUDGETS

Declare tokens, time, tool calls, loop count and escalation ceiling. Interface analysis for L02 - Cognitive Routing, MCD and FATTAH: budgets declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

FALLBACK

Degrade safely when models, knowledge, tools or services are unavailable. Governance analysis for L02 - Cognitive Routing, MCD and FATTAH: fallback is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L02 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ROUTING

Load the smallest sufficient model, knowledge, skills and tools for L02. Governance analysis for L02 - Cognitive Routing, MCD and FATTAH: routing is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

CONCURRENCY

Define idempotency, conflict, ordering, cancellation and partial-completion semantics. Research analysis for L02 - Cognitive Routing, MCD and FATTAH: formulate the null that a simpler kernel without this concurrency function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

STOP CONDITIONS

Stop on success, saturation, budget, risk, revoked authority or failed postcondition. Governance analysis for L02 - Cognitive Routing, MCD and FATTAH: stop conditions is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L02

Trigger	Name the condition that activates L02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L02 - Cognitive Routing, MCD and FATTAH.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L02 - Cognitive Routing, MCD and FATTAH: Interfaces and Contracts

UPSTREAM INTERFACES

MCD, Q-MCD, FATTAH, xt-mcd-service and prior layer objects provide validated state to L02. Interface analysis for L02 - Cognitive Routing, MCD and FATTAH: upstream interfaces declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

SERVICE MAPPING

Map L02 to one or more xt-* services without hiding ownership. Interface analysis for L02 - Cognitive Routing, MCD and FATTAH: service mapping declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

PROTOCOL MAPPING

CLI, MCP and REST representations preserve equivalent semantics. Research analysis for L02 - Cognitive Routing, MCD and FATTAH: formulate the null that a simpler kernel without this protocol mapping function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L02 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DOWNSTREAM INTERFACES

Consumers receive typed objects, never ambiguous prose-only handoffs. Layer analysis for L02 - Cognitive Routing, MCD and FATTAH: convert downstream interfaces into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

AGENT MAPPING

Agents activate the layer through mission contracts, not direct global state mutation. Governance analysis for L02 - Cognitive Routing, MCD and FATTAH: agent mapping is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

INTEGRATION TEST

Test missing, duplicate, delayed, conflicting and reordered messages. Layer analysis for L02 - Cognitive Routing, MCD and FATTAH: convert integration test into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L02

Trigger	Name the condition that activates L02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L02 - Cognitive Routing, MCD and FATTAH.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L02 - Cognitive Routing, MCD and FATTAH: Security and Authority

THREAT MODEL

Attack L02 through spoofed state, injection, stale evidence, permission confusion and resource exhaustion. Interface analysis for L02 - Cognitive Routing, MCD and FATTAH: threat model declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

DATA CONTROLS

Minimize, scope, encrypt, retain and delete data according to class and purpose. Research analysis for L02 - Cognitive Routing, MCD and FATTAH: formulate the null that a simpler kernel without this data controls function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

AUDIT

Log identifiers, decisions and postconditions without exposing secrets. Governance analysis for L02 - Cognitive Routing, MCD and FATTAH: audit is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L02 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

AUTHORIZATION

Classify actions T0-T4 and recheck authority at mutation time. Interface analysis for L02 - Cognitive Routing, MCD and FATTAH: authorization declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

SANDBOXING

Untrusted execution is isolated with bounded filesystem, process and network capabilities. Interface analysis for L02 - Cognitive Routing, MCD and FATTAH: sandboxing declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

SECURITY TESTS

Include malicious payload, revoked credential, path manipulation and recovery. Governance analysis for L02 - Cognitive Routing, MCD and FATTAH: security tests is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L02

Trigger	Name the condition that activates L02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L02 - Cognitive Routing, MCD and FATTAH.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L02 - Cognitive Routing, MCD and FATTAH: Failure and Recovery

FAILURE TAXONOMY

L02 can fail by wrong trigger, invalid object, stale state, dependency error or false success. Interface analysis for L02 - Cognitive Routing, MCD and FATTAH: failure taxonomy declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

CONTAINMENT

Stop downstream actions and preserve evidence when critical invariants fail. Research analysis for L02 - Cognitive Routing, MCD and FATTAH: formulate the null that a simpler kernel without this containment function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

LEARNING BOUNDARY

A failure trace is not promoted to memory or training until verified and de-identified. Research analysis for L02 - Cognitive Routing, MCD and FATTAH: formulate the null that a simpler kernel without this learning boundary function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L02 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DETECTION

Monitor decision value, route sparsity, reasoning cost, schema validity, drift and unclosed world effects. Interface analysis for L02 - Cognitive Routing, MCD and FATTAH: detection declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

RECOVERY

Restore from checkpoint, replay safe state and report residual mutation. Interface analysis for L02 - Cognitive Routing, MCD and FATTAH: recovery declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

INCIDENT OUTPUT

Emit root cause hypothesis, evidence, action, recovery and prevention record. Interface analysis for L02 - Cognitive Routing, MCD and FATTAH: incident output declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L02

Trigger	Name the condition that activates L02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L02 - Cognitive Routing, MCD and FATTAH.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L02 - Cognitive Routing, MCD and FATTAH: Benchmarks and Ablations

BASELINES

Compare prompt-only, monolithic agent and full kernel without this layer. Layer analysis for L02 - Cognitive Routing, MCD and FATTAH: convert baselines into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

SCENARIOS

Clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Interface analysis for L02 - Cognitive Routing, MCD and FATTAH: scenarios declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

EVIDENCE GRADES

E0 idea through E5 robust independent support; this atlas does not auto-promote. Governance analysis for L02 - Cognitive Routing, MCD and FATTAH: evidence grades is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L02 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ABLATIONS

Remove L02, replace it with a simpler rule and vary each dependency. Governance analysis for L02 - Cognitive Routing, MCD and FATTAH: ablations is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

METRICS

Primary: decision value, route sparsity, reasoning cost. Secondary: cost, latency, calibration, safety and recovery. Interface analysis for L02 - Cognitive Routing, MCD and FATTAH: metrics declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

REPLICATION

Release schemas, configs, tasks, seeds, traces and negative results where authorized. Layer analysis for L02 - Cognitive Routing, MCD and FATTAH: convert replication into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L02

Trigger	Name the condition that activates L02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L02 - Cognitive Routing, MCD and FATTAH.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L02 - Cognitive Routing, MCD and FATTAH: Implementation Roadmap

MINIMAL SLICE

Implement the smallest runnable L02 object and connect it to the evidence ledger. Interface analysis for L02 - Cognitive Routing, MCD and FATTAH: minimal slice declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

BENCHMARK GATE

Demonstrate improvement in decision value, route sparsity, reasoning cost under matched conditions. Research analysis for L02 - Cognitive Routing, MCD and FATTAH: formulate the null that a simpler kernel without this benchmark gate function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPEN GAPS

Track missing code, simulated telemetry, untested interfaces and unresolved definitions. Governance analysis for L02 - Cognitive Routing, MCD and FATTAH: open gaps is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L02 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

CONNECTION GATE

Prove upstream/downstream integration and state reconciliation. Governance analysis for L02 - Cognitive Routing, MCD and FATTAH: connection gate is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

PROMOTION GATE

Require security, recovery, transfer and human-authority review. Research analysis for L02 - Cognitive Routing, MCD and FATTAH: formulate the null that a simpler kernel without this promotion gate function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

NEXT RELEASE

Promote L02 only when artifact, tests and evidence status agree. Research analysis for L02 - Cognitive Routing, MCD and FATTAH: formulate the null that a simpler kernel without this next release function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX L02

Trigger	Name the condition that activates L02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L02 - Cognitive Routing, MCD and FATTAH.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L03 - Knowledge Substrate and Retrieval: Thesis and Boundary

LAYER THESIS

Knowledge Substrate and Retrieval owns hybrid lexical, vector and structured retrieval over the sovereign substrate. Its primary artifact is retrieval packet with provenance. The layer is part of the proposed L00-L11 MOUSSAIF XT kernel architecture. Layer analysis for L03 - Knowledge Substrate and Retrieval: convert layer thesis into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

BOUNDARY

L03 is skipped for tasks where its artifact is unnecessary. It does not by itself prove AGI, safety or consciousness. Governance analysis for L03 - Knowledge Substrate and Retrieval: boundary is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

STATUS DISCIPLINE

Specify PROPOSED, PROTOTYPED, CONNECTED, BENCHMARKED or REPLICATED separately. Governance analysis for L03 - Knowledge Substrate and Retrieval: status discipline is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L03 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

UNIQUE RESPONSIBILITY

The layer must expose value not already supplied by FTS5, BM25, vectors, RRF, xt-knowledge-service. The object changes a route, state, action or verification result. Research analysis for L03 - Knowledge Substrate and Retrieval: formulate the null that a simpler kernel without this unique responsibility function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

RESEARCH QUESTIONS

Does L03 improve precision, freshness, latency, contradiction rate under matched budgets? Does removal reveal a unique causal difference? Governance analysis for L03 - Knowledge Substrate and Retrieval: research questions is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

KERNEL ROLE

L03 participates in constitution-to-world-effect closure and remains independently disableable. Research analysis for L03 - Knowledge Substrate and Retrieval: formulate the null that a simpler kernel without this kernel role function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX

L03

Trigger	Name the condition that activates L03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L03 - Knowledge Substrate and Retrieval.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L03 - Knowledge Substrate and Retrieval: Objects and Schemas

SCHEMAS

Primary schema: retrieval packet with provenance; include task, state, version, authority, evidence, postcondition and residual uncertainty. Interface analysis for L03 - Knowledge Substrate and Retrieval: schemas declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OUTPUTS

Outputs feed downstream planning, routing, tools, courts, memory or learning according to L03. Interface analysis for L03 - Knowledge Substrate and Retrieval: outputs declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

VERSIONING

Schema migration preserves semantic meaning and supports replay of historical traces. Interface analysis for L03 - Knowledge Substrate and Retrieval: versioning declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L03 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

INPUTS

Inputs arrive from upstream kernel layers and FTS5, BM25, vectors, RRF, xt-knowledge-service; freshness and provenance are mandatory. Layer analysis for L03 - Knowledge Substrate and Retrieval: convert inputs into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

INVARIANTS

Observed, inferred, intended, simulated and unknown state remain distinct. No silent privilege escalation. Layer analysis for L03 - Knowledge Substrate and Retrieval: convert invariants into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

ARTIFACT TEST

Reject malformed, incomplete, stale, unauthorized or causally inert objects. Governance analysis for L03 - Knowledge Substrate and Retrieval: artifact test is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L03

Trigger	Name the condition that activates L03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L03 - Knowledge Substrate and Retrieval.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L03 - Knowledge Substrate and Retrieval: Runtime Algorithm

RUNTIME PATH

Trigger -> validate -> retrieve -> transform -> verify -> emit retrieval packet with provenance -> reconcile -> ledger. Layer analysis for L03 - Knowledge Substrate and Retrieval: convert runtime path into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

BUDGETS

Declare tokens, time, tool calls, loop count and escalation ceiling. Interface analysis for L03 - Knowledge Substrate and Retrieval: budgets declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

FALLBACK

Degrade safely when models, knowledge, tools or services are unavailable. Governance analysis for L03 - Knowledge Substrate and Retrieval: fallback is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L03 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ROUTING

Load the smallest sufficient model, knowledge, skills and tools for L03. Governance analysis for L03 - Knowledge Substrate and Retrieval: routing is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

CONCURRENCY

Define idempotency, conflict, ordering, cancellation and partial-completion semantics. Research analysis for L03 - Knowledge Substrate and Retrieval: formulate the null that a simpler kernel without this concurrency function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

STOP CONDITIONS

Stop on success, saturation, budget, risk, revoked authority or failed postcondition. Governance analysis for L03 - Knowledge Substrate and Retrieval: stop conditions is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L03

Trigger	Name the condition that activates L03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L03 - Knowledge Substrate and Retrieval.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L03 - Knowledge Substrate and Retrieval: Interfaces and Contracts

UPSTREAM INTERFACES

FTS5, BM25, vectors, RRF, xt-knowledge-service and prior layer objects provide validated state to L03. Interface analysis for L03 - Knowledge Substrate and Retrieval: upstream interfaces declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

SERVICE MAPPING

Map L03 to one or more xt-* services without hiding ownership. Interface analysis for L03 - Knowledge Substrate and Retrieval: service mapping declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

PROTOCOL MAPPING

CLI, MCP and REST representations preserve equivalent semantics. Research analysis for L03 - Knowledge Substrate and Retrieval: formulate the null that a simpler kernel without this protocol mapping function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L03 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DOWNSTREAM INTERFACES

Consumers receive typed objects, never ambiguous prose-only handoffs. Layer analysis for L03 - Knowledge Substrate and Retrieval: convert downstream interfaces into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

AGENT MAPPING

Agents activate the layer through mission contracts, not direct global state mutation. Governance analysis for L03 - Knowledge Substrate and Retrieval: agent mapping is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

INTEGRATION TEST

Test missing, duplicate, delayed, conflicting and reordered messages. Layer analysis for L03 - Knowledge Substrate and Retrieval: convert integration test into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L03

Trigger	Name the condition that activates L03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L03 - Knowledge Substrate and Retrieval.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L03 - Knowledge Substrate and Retrieval: Security and Authority

THREAT MODEL

Attack L03 through spoofed state, injection, stale evidence, permission confusion and resource exhaustion. Interface analysis for L03 - Knowledge Substrate and Retrieval: threat model declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

DATA CONTROLS

Minimize, scope, encrypt, retain and delete data according to class and purpose. Research analysis for L03 - Knowledge Substrate and Retrieval: formulate the null that a simpler kernel without this data controls function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

AUDIT

Log identifiers, decisions and postconditions without exposing secrets. Governance analysis for L03 - Knowledge Substrate and Retrieval: audit is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L03 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

AUTHORIZATION

Classify actions T0-T4 and recheck authority at mutation time. Interface analysis for L03 - Knowledge Substrate and Retrieval: authorization declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

SANDBOXING

Untrusted execution is isolated with bounded filesystem, process and network capabilities. Interface analysis for L03 - Knowledge Substrate and Retrieval: sandboxing declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

SECURITY TESTS

Include malicious payload, revoked credential, path manipulation and recovery. Governance analysis for L03 - Knowledge Substrate and Retrieval: security tests is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX — L03

Trigger	Name the condition that activates L03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L03 - Knowledge Substrate and Retrieval.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L03 - Knowledge Substrate and Retrieval: Failure and Recovery

FAILURE TAXONOMY

L03 can fail by wrong trigger, invalid object, stale state, dependency error or false success. Interface analysis for L03 - Knowledge Substrate and Retrieval: failure taxonomy declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

CONTAINMENT

Stop downstream actions and preserve evidence when critical invariants fail. Research analysis for L03 - Knowledge Substrate and Retrieval: formulate the null that a simpler kernel without this containment function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

LEARNING BOUNDARY

A failure trace is not promoted to memory or training until verified and de-identified. Research analysis for L03 - Knowledge Substrate and Retrieval: formulate the null that a simpler kernel without this learning boundary function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L03 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DETECTION

Monitor precision, freshness, latency, contradiction rate, schema validity, drift and unclosed world effects. Interface analysis for L03 - Knowledge Substrate and Retrieval: detection declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

RECOVERY

Restore from checkpoint, replay safe state and report residual mutation. Interface analysis for L03 - Knowledge Substrate and Retrieval: recovery declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

INCIDENT OUTPUT

Emit root cause hypothesis, evidence, action, recovery and prevention record. Interface analysis for L03 - Knowledge Substrate and Retrieval: incident output declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L03

Trigger	Name the condition that activates L03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L03 - Knowledge Substrate and Retrieval.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L03 - Knowledge Substrate and Retrieval: Benchmarks and Ablations

BASELINES

Compare prompt-only, monolithic agent and full kernel without this layer. Layer analysis for L03 - Knowledge Substrate and Retrieval: convert baselines into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

SCENARIOS

Clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Interface analysis for L03 - Knowledge Substrate and Retrieval: scenarios declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

EVIDENCE GRADES

E0 idea through E5 robust independent support; this atlas does not auto-promote. Governance analysis for L03 - Knowledge Substrate and Retrieval: evidence grades is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L03 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ABLATIONS

Remove L03, replace it with a simpler rule and vary each dependency. Governance analysis for L03 - Knowledge Substrate and Retrieval: ablations is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

METRICS

Primary: precision, freshness, latency, contradiction rate. Secondary: cost, latency, calibration, safety and recovery. Interface analysis for L03 - Knowledge Substrate and Retrieval: metrics declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

REPLICATION

Release schemas, configs, tasks, seeds, traces and negative results where authorized. Layer analysis for L03 - Knowledge Substrate and Retrieval: convert replication into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L03

Trigger	Name the condition that activates L03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L03 - Knowledge Substrate and Retrieval.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L03 - Knowledge Substrate and Retrieval: Implementation Roadmap

MINIMAL SLICE

Implement the smallest runnable L03 object and connect it to the evidence ledger. Interface analysis for L03 - Knowledge Substrate and Retrieval: minimal slice declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

BENCHMARK GATE

Demonstrate improvement in precision, freshness, latency, contradiction rate under matched conditions. Research analysis for L03 - Knowledge Substrate and Retrieval: formulate the null that a simpler kernel without this benchmark gate function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPEN GAPS

Track missing code, simulated telemetry, untested interfaces and unresolved definitions. Governance analysis for L03 - Knowledge Substrate and Retrieval: open gaps is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L03 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

CONNECTION GATE

Prove upstream/downstream integration and state reconciliation. Governance analysis for L03 - Knowledge Substrate and Retrieval: connection gate is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

PROMOTION GATE

Require security, recovery, transfer and human-authority review. Research analysis for L03 - Knowledge Substrate and Retrieval: formulate the null that a simpler kernel without this promotion gate function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

NEXT RELEASE

Promote L03 only when artifact, tests and evidence status agree. Research analysis for L03 - Knowledge Substrate and Retrieval: formulate the null that a simpler kernel without this next release function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX — L03

Trigger	Name the condition that activates L03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L03 - Knowledge Substrate and Retrieval.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L04 - GraphRAG, Context Genome and Capsules: Thesis and Boundary

LAYER THESIS

GraphRAG, Context Genome and Capsules owns relationship-aware context assembly, compaction and bounded handoffs. Its primary artifact is context genome and capsule. The layer is part of the proposed L00-L11 MOUSSAIF XT kernel architecture. Research analysis for L04 - GraphRAG, Context Genome and Capsules: formulate the null that a simpler kernel without this layer thesis function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

BOUNDARY

L04 is skipped for tasks where its artifact is unnecessary. It does not by itself prove AGI, safety or consciousness. Interface analysis for L04 - GraphRAG, Context Genome and Capsules: boundary declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

STATUS DISCIPLINE

Specify PROPOSED, PROTOTYPED, CONNECTED, BENCHMARKED or REPLICATED separately. Interface analysis for L04 - GraphRAG, Context Genome and Capsules: status discipline declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L04 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

UNIQUE RESPONSIBILITY

The layer must expose value not already supplied by GraphRAG, MCCT, xt-context-engine. The object changes a route, state, action or verification result. Layer analysis for L04 - GraphRAG, Context Genome and Capsules: convert unique responsibility into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

RESEARCH QUESTIONS

Does L04 improve compression fidelity, graph coverage, token reduction under matched budgets? Does removal reveal a unique causal difference? Interface analysis for L04 - GraphRAG, Context Genome and Capsules: research questions declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

KERNEL ROLE

L04 participates in constitution-to-world-effect closure and remains independently disableable. Layer analysis for L04 - GraphRAG, Context Genome and Capsules: convert kernel role into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L04

Trigger	Name the condition that activates L04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L04 - GraphRAG, Context Genome and Capsules.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L04 - GraphRAG, Context Genome and Capsules: Objects and Schemas

SCHEMAS

Primary schema: context genome and capsule; include task, state, version, authority, evidence, postcondition and residual uncertainty. Governance analysis for L04 - GraphRAG, Context Genome and Capsules: schemas is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OUTPUTS

Outputs feed downstream planning, routing, tools, courts, memory or learning according to L04. Governance analysis for L04 - GraphRAG, Context Genome and Capsules: outputs is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

VERSIONING

Schema migration preserves semantic meaning and supports replay of historical traces. Governance analysis for L04 - GraphRAG, Context Genome and Capsules: versioning is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L04 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

INPUTS

Inputs arrive from upstream kernel layers and GraphRAG, MCCT, xt-context-engine; freshness and provenance are mandatory. Research analysis for L04 - GraphRAG, Context Genome and Capsules: formulate the null that a simpler kernel without this inputs function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

INVARIANTS

Observed, inferred, intended, simulated and unknown state remain distinct. No silent privilege escalation. Research analysis for L04 - GraphRAG, Context Genome and Capsules: formulate the null that a simpler kernel without this invariants function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

ARTIFACT TEST

Reject malformed, incomplete, stale, unauthorized or causally inert objects. Interface analysis for L04 - GraphRAG, Context Genome and Capsules: artifact test declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L04

Trigger	Name the condition that activates L04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L04 - GraphRAG, Context Genome and Capsules.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L04 - GraphRAG, Context Genome and Capsules: Runtime Algorithm

RUNTIME PATH

Trigger -> validate -> retrieve -> transform -> verify -> emit context genome and capsule -> reconcile -> ledger. Research analysis for L04 - GraphRAG, Context Genome and Capsules: formulate the null that a simpler kernel without this runtime path function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

BUDGETS

Declare tokens, time, tool calls, loop count and escalation ceiling. Governance analysis for L04 - GraphRAG, Context Genome and Capsules: budgets is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

FALLBACK

Degrade safely when models, knowledge, tools or services are unavailable. Interface analysis for L04 - GraphRAG, Context Genome and Capsules: fallback declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L04 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ROUTING

Load the smallest sufficient model, knowledge, skills and tools for L04. Interface analysis for L04 - GraphRAG, Context Genome and Capsules: routing declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

CONCURRENCY

Define idempotency, conflict, ordering, cancellation and partial-completion semantics. Layer analysis for L04 - GraphRAG, Context Genome and Capsules: convert concurrency into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

STOP CONDITIONS

Stop on success, saturation, budget, risk, revoked authority or failed postcondition. Interface analysis for L04 - GraphRAG, Context Genome and Capsules: stop conditions declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L04

Trigger	Name the condition that activates L04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L04 - GraphRAG, Context Genome and Capsules.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L04 - GraphRAG, Context Genome and Capsules: Interfaces and Contracts

UPSTREAM INTERFACES

GraphRAG, MCCT, xt-context-engine and prior layer objects provide validated state to L04. Governance analysis for L04 - GraphRAG, Context Genome and Capsules: upstream interfaces is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

SERVICE MAPPING

Map L04 to one or more xt-* services without hiding ownership. Governance analysis for L04 - GraphRAG, Context Genome and Capsules: service mapping is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

PROTOCOL MAPPING

CLI, MCP and REST representations preserve equivalent semantics. Layer analysis for L04 - GraphRAG, Context Genome and Capsules: convert protocol mapping into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L04 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DOWNSTREAM INTERFACES

Consumers receive typed objects, never ambiguous prose-only handoffs. Research analysis for L04 - GraphRAG, Context Genome and Capsules: formulate the null that a simpler kernel without this downstream interfaces function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

AGENT MAPPING

Agents activate the layer through mission contracts, not direct global state mutation. Interface analysis for L04 - GraphRAG, Context Genome and Capsules: agent mapping declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

INTEGRATION TEST

Test missing, duplicate, delayed, conflicting and reordered messages. Research analysis for L04 - GraphRAG, Context Genome and Capsules: formulate the null that a simpler kernel without this integration test function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX

L04

Trigger	Name the condition that activates L04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L04 - GraphRAG, Context Genome and Capsules.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L04 - GraphRAG, Context Genome and Capsules: Security and Authority

THREAT MODEL

Attack L04 through spoofed state, injection, stale evidence, permission confusion and resource exhaustion. Governance analysis for L04 - GraphRAG, Context Genome and Capsules: threat model is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

DATA CONTROLS

Minimize, scope, encrypt, retain and delete data according to class and purpose. Layer analysis for L04 - GraphRAG, Context Genome and Capsules: convert data controls into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

AUDIT

Log identifiers, decisions and postconditions without exposing secrets. Interface analysis for L04 - GraphRAG, Context Genome and Capsules: audit declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L04 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

AUTHORIZATION

Classify actions T0-T4 and recheck authority at mutation time. Governance analysis for L04 - GraphRAG, Context Genome and Capsules: authorization is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

SANDBOXING

Untrusted execution is isolated with bounded filesystem, process and network capabilities. Governance analysis for L04 - GraphRAG, Context Genome and Capsules: sandboxing is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

SECURITY TESTS

Include malicious payload, revoked credential, path manipulation and recovery. Interface analysis for L04 - GraphRAG, Context Genome and Capsules: security tests declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L04

Trigger	Name the condition that activates L04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L04 - GraphRAG, Context Genome and Capsules.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L04 - GraphRAG, Context Genome and Capsules: Failure and Recovery

FAILURE TAXONOMY

L04 can fail by wrong trigger, invalid object, stale state, dependency error or false success. Governance analysis for L04 - GraphRAG, Context Genome and Capsules: failure taxonomy is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

CONTAINMENT

Stop downstream actions and preserve evidence when critical invariants fail. Layer analysis for L04 - GraphRAG, Context Genome and Capsules: convert containment into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

LEARNING BOUNDARY

A failure trace is not promoted to memory or training until verified and de-identified. Layer analysis for L04 - GraphRAG, Context Genome and Capsules: convert learning boundary into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L04 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DETECTION

Monitor compression fidelity, graph coverage, token reduction, schema validity, drift and unclosed world effects. Governance analysis for L04 - GraphRAG, Context Genome and Capsules: detection is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

RECOVERY

Restore from checkpoint, replay safe state and report residual mutation. Governance analysis for L04 - GraphRAG, Context Genome and Capsules: recovery is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

INCIDENT OUTPUT

Emit root cause hypothesis, evidence, action, recovery and prevention record. Governance analysis for L04 - GraphRAG, Context Genome and Capsules: incident output is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L04

Trigger	Name the condition that activates L04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L04 - GraphRAG, Context Genome and Capsules.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L04 - GraphRAG, Context Genome and Capsules: Benchmarks and Ablations

BASELINES

Compare prompt-only, monolithic agent and full kernel without this layer. Research analysis for L04 - GraphRAG, Context Genome and Capsules: formulate the null that a simpler kernel without this baselines function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

SCENARIOS

Clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Governance analysis for L04 - GraphRAG, Context Genome and Capsules: scenarios is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

EVIDENCE GRADES

E0 idea through E5 robust independent support; this atlas does not auto-promote. Interface analysis for L04 - GraphRAG, Context Genome and Capsules: evidence grades declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L04 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ABLATIONS

Remove L04, replace it with a simpler rule and vary each dependency. Interface analysis for L04 - GraphRAG, Context Genome and Capsules: ablations declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

METRICS

Primary: compression fidelity, graph coverage, token reduction. Secondary: cost, latency, calibration, safety and recovery. Governance analysis for L04 - GraphRAG, Context Genome and Capsules: metrics is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

REPLICATION

Release schemas, configs, tasks, seeds, traces and negative results where authorized. Research analysis for L04 - GraphRAG, Context Genome and Capsules: formulate the null that a simpler kernel without this replication function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX

L04

Trigger	Name the condition that activates L04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L04 - GraphRAG, Context Genome and Capsules.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L04 - GraphRAG, Context Genome and Capsules: Implementation Roadmap

MINIMAL SLICE

Implement the smallest runnable L04 object and connect it to the evidence ledger. Governance analysis for L04 - GraphRAG, Context Genome and Capsules: minimal slice is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

BENCHMARK GATE

Demonstrate improvement in compression fidelity, graph coverage, token reduction under matched conditions. Layer analysis for L04 - GraphRAG, Context Genome and Capsules: convert benchmark gate into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPEN GAPS

Track missing code, simulated telemetry, untested interfaces and unresolved definitions. Interface analysis for L04 - GraphRAG, Context Genome and Capsules: open gaps declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L04 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

CONNECTION GATE

Prove upstream/downstream integration and state reconciliation. Interface analysis for L04 - GraphRAG, Context Genome and Capsules: connection gate declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

PROMOTION GATE

Require security, recovery, transfer and human-authority review. Layer analysis for L04 - GraphRAG, Context Genome and Capsules: convert promotion gate into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

NEXT RELEASE

Promote L04 only when artifact, tests and evidence status agree. Layer analysis for L04 - GraphRAG, Context Genome and Capsules: convert next release into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX L04

Trigger	Name the condition that activates L04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L04 - GraphRAG, Context Genome and Capsules.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L05 - HyperSkills and Capability Activation: Thesis and Boundary

LAYER THESIS

HyperSkills and Capability Activation owns typed reusable capabilities selected by task triggers and evidence needs. Its primary artifact is activated HyperSkill set. The layer is part of the proposed L00-L11 MOUSSAIF XT kernel architecture. Interface analysis for L05 - HyperSkills and Capability Activation: layer thesis declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

BOUNDARY

L05 is skipped for tasks where its artifact is unnecessary. It does not by itself prove AGI, safety or consciousness. Layer analysis for L05 - HyperSkills and Capability Activation: convert boundary into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

STATUS DISCIPLINE

Specify PROPOSED, PROTOTYPED, CONNECTED, BENCHMARKED or REPLICATED separately. Layer analysis for L05 - HyperSkills and Capability Activation: convert status discipline into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L05 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

UNIQUE RESPONSIBILITY

The layer must expose value not already supplied by MHSG, MSHR, xt-skill-registry. The object changes a route, state, action or verification result. Governance analysis for L05 - HyperSkills and Capability Activation: unique responsibility is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

RESEARCH QUESTIONS

Does L05 improve activation precision, reuse, duplicate rate under matched budgets? Does removal reveal a unique causal difference? Layer analysis for L05 - HyperSkills and Capability Activation: convert research questions into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

KERNEL ROLE

L05 participates in constitution-to-world-effect closure and remains independently disableable. Governance analysis for L05 - HyperSkills and Capability Activation: kernel role is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L05

Trigger	Name the condition that activates L05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L05 - HyperSkills and Capability Activation.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L05 - HyperSkills and Capability Activation: Objects and Schemas

SCHEMAS

Primary schema: activated HyperSkill set; include task, state, version, authority, evidence, postcondition and residual uncertainty. Research analysis for L05 - HyperSkills and Capability Activation: formulate the null that a simpler kernel without this schemas function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OUTPUTS

Outputs feed downstream planning, routing, tools, courts, memory or learning according to L05. Research analysis for L05 - HyperSkills and Capability Activation: formulate the null that a simpler kernel without this outputs function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

VERSIONING

Schema migration preserves semantic meaning and supports replay of historical traces. Research analysis for L05 - HyperSkills and Capability Activation: formulate the null that a simpler kernel without this versioning function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L05 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

INPUTS

Inputs arrive from upstream kernel layers and MHSG, MSHR, xt-skill-registry; freshness and provenance are mandatory. Interface analysis for L05 - HyperSkills and Capability Activation: inputs declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

INVARIANTS

Observed, inferred, intended, simulated and unknown state remain distinct. No silent privilege escalation. Interface analysis for L05 - HyperSkills and Capability Activation: invariants declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

ARTIFACT TEST

Reject malformed, incomplete, stale, unauthorized or causally inert objects. Layer analysis for L05 - HyperSkills and Capability Activation: convert artifact test into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L05

Trigger	Name the condition that activates L05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L05 - HyperSkills and Capability Activation.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L05 - HyperSkills and Capability Activation: Runtime Algorithm

RUNTIME PATH

Trigger -> validate -> retrieve -> transform -> verify -> emit activated HyperSkill set -> reconcile -> ledger. Interface analysis for L05 - HyperSkills and Capability Activation: runtime path declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

BUDGETS

Declare tokens, time, tool calls, loop count and escalation ceiling. Research analysis for L05 - HyperSkills and Capability Activation: formulate the null that a simpler kernel without this budgets function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

FALLBACK

Degrade safely when models, knowledge, tools or services are unavailable. Layer analysis for L05 - HyperSkills and Capability Activation: convert fallback into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L05 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ROUTING

Load the smallest sufficient model, knowledge, skills and tools for L05. Layer analysis for L05 - HyperSkills and Capability Activation: convert routing into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

CONCURRENCY

Define idempotency, conflict, ordering, cancellation and partial-completion semantics. Governance analysis for L05 - HyperSkills and Capability Activation: concurrency is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

STOP CONDITIONS

Stop on success, saturation, budget, risk, revoked authority or failed postcondition. Layer analysis for L05 - HyperSkills and Capability Activation: convert stop conditions into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX L05

Trigger	Name the condition that activates L05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L05 - HyperSkills and Capability Activation.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L05 - HyperSkills and Capability Activation: Interfaces and Contracts

UPSTREAM INTERFACES

MHSG, MSHR, xt-skill-registry and prior layer objects provide validated state to L05. Research analysis for L05 - HyperSkills and Capability Activation: formulate the null that a simpler kernel without this upstream interfaces function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

SERVICE MAPPING

Map L05 to one or more xt-* services without hiding ownership. Research analysis for L05 - HyperSkills and Capability Activation: formulate the null that a simpler kernel without this service mapping function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

PROTOCOL MAPPING

CLI, MCP and REST representations preserve equivalent semantics. Governance analysis for L05 - HyperSkills and Capability Activation: protocol mapping is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

لا يدخل L05 canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DOWNSTREAM INTERFACES

Consumers receive typed objects, never ambiguous prose-only handoffs. Interface analysis for L05 - HyperSkills and Capability Activation: downstream interfaces declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

AGENT MAPPING

Agents activate the layer through mission contracts, not direct global state mutation. Layer analysis for L05 - HyperSkills and Capability Activation: convert agent mapping into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

INTEGRATION TEST

Test missing, duplicate, delayed, conflicting and reordered messages. Interface analysis for L05 - HyperSkills and Capability Activation: integration test declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L05

Trigger	Name the condition that activates L05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L05 - HyperSkills and Capability Activation.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L05 - HyperSkills and Capability Activation: Security and Authority

THREAT MODEL

Attack L05 through spoofed state, injection, stale evidence, permission confusion and resource exhaustion. Research analysis for L05 - HyperSkills and Capability Activation: formulate the null that a simpler kernel without this threat model function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

DATA CONTROLS

Minimize, scope, encrypt, retain and delete data according to class and purpose. Governance analysis for L05 - HyperSkills and Capability Activation: data controls is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

AUDIT

Log identifiers, decisions and postconditions without exposing secrets. Layer analysis for L05 - HyperSkills and Capability Activation: convert audit into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L05 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

AUTHORIZATION

Classify actions T0-T4 and recheck authority at mutation time. Research analysis for L05 - HyperSkills and Capability Activation: formulate the null that a simpler kernel without this authorization function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

SANDBOXING

Untrusted execution is isolated with bounded filesystem, process and network capabilities. Research analysis for L05 - HyperSkills and Capability Activation: formulate the null that a simpler kernel without this sandboxing function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

SECURITY TESTS

Include malicious payload, revoked credential, path manipulation and recovery. Layer analysis for L05 - HyperSkills and Capability Activation: convert security tests into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L05

Trigger	Name the condition that activates L05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L05 - HyperSkills and Capability Activation.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L05 - HyperSkills and Capability Activation: Failure and Recovery

FAILURE TAXONOMY

L05 can fail by wrong trigger, invalid object, stale state, dependency error or false success. Research analysis for L05 - HyperSkills and Capability Activation: formulate the null that a simpler kernel without this failure taxonomy function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

CONTAINMENT

Stop downstream actions and preserve evidence when critical invariants fail. Governance analysis for L05 - HyperSkills and Capability Activation: containment is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

LEARNING BOUNDARY

A failure trace is not promoted to memory or training until verified and de-identified. Governance analysis for L05 - HyperSkills and Capability Activation: learning boundary is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L05 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DETECTION

Monitor activation precision, reuse, duplicate rate, schema validity, drift and unclosed world effects. Research analysis for L05 - HyperSkills and Capability Activation: formulate the null that a simpler kernel without this detection function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

RECOVERY

Restore from checkpoint, replay safe state and report residual mutation. Research analysis for L05 - HyperSkills and Capability Activation: formulate the null that a simpler kernel without this recovery function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

INCIDENT OUTPUT

Emit root cause hypothesis, evidence, action, recovery and prevention record. Research analysis for L05 - HyperSkills and Capability Activation: formulate the null that a simpler kernel without this incident output function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX

L05

Trigger	Name the condition that activates L05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L05 - HyperSkills and Capability Activation.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L05 - HyperSkills and Capability Activation: Benchmarks and Ablations

BASELINES

Compare prompt-only, monolithic agent and full kernel without this layer. Interface analysis for L05 - HyperSkills and Capability Activation: baselines declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

SCENARIOS

Clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Research analysis for L05 - HyperSkills and Capability Activation: formulate the null that a simpler kernel without this scenarios function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

EVIDENCE GRADES

E0 idea through E5 robust independent support; this atlas does not auto-promote. Layer analysis for L05 - HyperSkills and Capability Activation: convert evidence grades into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L05 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ABLATIONS

Remove L05, replace it with a simpler rule and vary each dependency. Layer analysis for L05 - HyperSkills and Capability Activation: convert ablations into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

METRICS

Primary: activation precision, reuse, duplicate rate. Secondary: cost, latency, calibration, safety and recovery. Research analysis for L05 - HyperSkills and Capability Activation: formulate the null that a simpler kernel without this metrics function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

REPLICATION

Release schemas, configs, tasks, seeds, traces and negative results where authorized. Interface analysis for L05 - HyperSkills and Capability Activation: replication declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L05

Trigger	Name the condition that activates L05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L05 - HyperSkills and Capability Activation.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L05 - HyperSkills and Capability Activation: Implementation Roadmap

MINIMAL SLICE

Implement the smallest runnable L05 object and connect it to the evidence ledger. Research analysis for L05 - HyperSkills and Capability Activation: formulate the null that a simpler kernel without this minimal slice function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

BENCHMARK GATE

Demonstrate improvement in activation precision, reuse, duplicate rate under matched conditions. Governance analysis for L05 - HyperSkills and Capability Activation: benchmark gate is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPEN GAPS

Track missing code, simulated telemetry, untested interfaces and unresolved definitions. Layer analysis for L05 - HyperSkills and Capability Activation: convert open gaps into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L05 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

CONNECTION GATE

Prove upstream/downstream integration and state reconciliation. Layer analysis for L05 - HyperSkills and Capability Activation: convert connection gate into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

PROMOTION GATE

Require security, recovery, transfer and human-authority review. Governance analysis for L05 - HyperSkills and Capability Activation: promotion gate is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

NEXT RELEASE

Promote L05 only when artifact, tests and evidence status agree. Governance analysis for L05 - HyperSkills and Capability Activation: next release is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L05

Trigger	Name the condition that activates L05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L05 - HyperSkills and Capability Activation.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L06 - HyperAbilities and Competence Composition: Thesis and Boundary

LAYER THESIS

HyperAbilities and Competence Composition owns composing multiple skills into higher-order, testable abilities. Its primary artifact is HyperAbility execution contract. The layer is part of the proposed L00-L11 MOUSSAIF XT kernel architecture. Interface analysis for L06 - HyperAbilities and Competence Composition: layer thesis declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

BOUNDARY

L06 is skipped for tasks where its artifact is unnecessary. It does not by itself prove AGI, safety or consciousness. Layer analysis for L06 - HyperAbilities and Competence Composition: convert boundary into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

STATUS DISCIPLINE

Specify PROPOSED, PROTOTYPED, CONNECTED, BENCHMARKED or REPLICATED separately. Layer analysis for L06 - HyperAbilities and Competence Composition: convert status discipline into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L06 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

UNIQUE RESPONSIBILITY

The layer must expose value not already supplied by MCIP, MHSG, HyperHarness. The object changes a route, state, action or verification result. Governance analysis for L06 - HyperAbilities and Competence Composition: unique responsibility is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

RESEARCH QUESTIONS

Does L06 improve composition gain, interface defects, transfer under matched budgets? Does removal reveal a unique causal difference? Layer analysis for L06 - HyperAbilities and Competence Composition: convert research questions into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

KERNEL ROLE

L06 participates in constitution-to-world-effect closure and remains independently disableable. Governance analysis for L06 - HyperAbilities and Competence Composition: kernel role is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L06

Trigger	Name the condition that activates L06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L06 - HyperAbilities and Competence Composition.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L06 - HyperAbilities and Competence Composition: Objects and Schemas

SCHEMAS

Primary schema: HyperAbility execution contract; include task, state, version, authority, evidence, postcondition and residual uncertainty. Research analysis for L06 - HyperAbilities and Competence Composition: formulate the null that a simpler kernel without this schemas function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OUTPUTS

Outputs feed downstream planning, routing, tools, courts, memory or learning according to L06. Research analysis for L06 - HyperAbilities and Competence Composition: formulate the null that a simpler kernel without this outputs function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

VERSIONING

Schema migration preserves semantic meaning and supports replay of historical traces. Research analysis for L06 - HyperAbilities and Competence Composition: formulate the null that a simpler kernel without this versioning function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

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INPUTS

Inputs arrive from upstream kernel layers and MCIP, MHSG, HyperHarness; freshness and provenance are mandatory. Interface analysis for L06 - HyperAbilities and Competence Composition: inputs declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

INVARIANTS

Observed, inferred, intended, simulated and unknown state remain distinct. No silent privilege escalation. Interface analysis for L06 - HyperAbilities and Competence Composition: invariants declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

ARTIFACT TEST

Reject malformed, incomplete, stale, unauthorized or causally inert objects. Layer analysis for L06 - HyperAbilities and Competence Composition: convert artifact test into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L06

Trigger	Name the condition that activates L06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L06 - HyperAbilities and Competence Composition.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L06 - HyperAbilities and Competence Composition: Runtime Algorithm

RUNTIME PATH

Trigger -> validate -> retrieve -> transform -> verify -> emit HyperAbility execution contract -> reconcile -> ledger. Interface analysis for L06 - HyperAbilities and Competence Composition: runtime path declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

BUDGETS

Declare tokens, time, tool calls, loop count and escalation ceiling. Research analysis for L06 - HyperAbilities and Competence Composition: formulate the null that a simpler kernel without this budgets function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

FALLBACK

Degrade safely when models, knowledge, tools or services are unavailable. Layer analysis for L06 - HyperAbilities and Competence Composition: convert fallback into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

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ROUTING

Load the smallest sufficient model, knowledge, skills and tools for L06. Layer analysis for L06 - HyperAbilities and Competence Composition: convert routing into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

CONCURRENCY

Define idempotency, conflict, ordering, cancellation and partial-completion semantics. Governance analysis for L06 - HyperAbilities and Competence Composition: concurrency is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

STOP CONDITIONS

Stop on success, saturation, budget, risk, revoked authority or failed postcondition. Layer analysis for L06 - HyperAbilities and Competence Composition: convert stop conditions into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L06

Trigger	Name the condition that activates L06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L06 - HyperAbilities and Competence Composition.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L06 - HyperAbilities and Competence Composition: Interfaces and Contracts

UPSTREAM INTERFACES

MCIP, MHSG, HyperHarness and prior layer objects provide validated state to L06. Research analysis for L06 - HyperAbilities and Competence Composition: formulate the null that a simpler kernel without this upstream interfaces function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

SERVICE MAPPING

Map L06 to one or more xt-* services without hiding ownership. Research analysis for L06 - HyperAbilities and Competence Composition: formulate the null that a simpler kernel without this service mapping function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

PROTOCOL MAPPING

CLI, MCP and REST representations preserve equivalent semantics. Governance analysis for L06 - HyperAbilities and Competence Composition: protocol mapping is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

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DOWNSTREAM INTERFACES

Consumers receive typed objects, never ambiguous prose-only handoffs. Interface analysis for L06 - HyperAbilities and Competence Composition: downstream interfaces declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

AGENT MAPPING

Agents activate the layer through mission contracts, not direct global state mutation. Layer analysis for L06 - HyperAbilities and Competence Composition: convert agent mapping into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

INTEGRATION TEST

Test missing, duplicate, delayed, conflicting and reordered messages. Interface analysis for L06 - HyperAbilities and Competence Composition: integration test declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L06

Trigger	Name the condition that activates L06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L06 - HyperAbilities and Competence Composition.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L06 - HyperAbilities and Competence Composition: Security and Authority

THREAT MODEL

Attack L06 through spoofed state, injection, stale evidence, permission confusion and resource exhaustion. Research analysis for L06 - HyperAbilities and Competence Composition: formulate the null that a simpler kernel without this threat model function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

DATA CONTROLS

Minimize, scope, encrypt, retain and delete data according to class and purpose. Governance analysis for L06 - HyperAbilities and Competence Composition: data controls is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

AUDIT

Log identifiers, decisions and postconditions without exposing secrets. Layer analysis for L06 - HyperAbilities and Competence Composition: convert audit into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L06 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

AUTHORIZATION

Classify actions T0-T4 and recheck authority at mutation time. Research analysis for L06 - HyperAbilities and Competence Composition: formulate the null that a simpler kernel without this authorization function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

SANDBOXING

Untrusted execution is isolated with bounded filesystem, process and network capabilities. Research analysis for L06 - HyperAbilities and Competence Composition: formulate the null that a simpler kernel without this sandboxing function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

SECURITY TESTS

Include malicious payload, revoked credential, path manipulation and recovery. Layer analysis for L06 - HyperAbilities and Competence Composition: convert security tests into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L06

Trigger	Name the condition that activates L06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L06 - HyperAbilities and Competence Composition.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L06 - HyperAbilities and Competence Composition: Failure and Recovery

FAILURE TAXONOMY

L06 can fail by wrong trigger, invalid object, stale state, dependency error or false success. Research analysis for L06 - HyperAbilities and Competence Composition: formulate the null that a simpler kernel without this failure taxonomy function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

CONTAINMENT

Stop downstream actions and preserve evidence when critical invariants fail. Governance analysis for L06 - HyperAbilities and Competence Composition: containment is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

LEARNING BOUNDARY

A failure trace is not promoted to memory or training until verified and de-identified. Governance analysis for L06 - HyperAbilities and Competence Composition: learning boundary is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L06 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DETECTION

Monitor composition gain, interface defects, transfer, schema validity, drift and unclosed world effects. Research analysis for L06 - HyperAbilities and Competence Composition: formulate the null that a simpler kernel without this detection function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

RECOVERY

Restore from checkpoint, replay safe state and report residual mutation. Research analysis for L06 - HyperAbilities and Competence Composition: formulate the null that a simpler kernel without this recovery function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

INCIDENT OUTPUT

Emit root cause hypothesis, evidence, action, recovery and prevention record. Research analysis for L06 - HyperAbilities and Competence Composition: formulate the null that a simpler kernel without this incident output function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX

L06

Trigger	Name the condition that activates L06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L06 - HyperAbilities and Competence Composition.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L06 - HyperAbilities and Competence Composition: Benchmarks and Ablations

BASELINES

Compare prompt-only, monolithic agent and full kernel without this layer. Interface analysis for L06 - HyperAbilities and Competence Composition: baselines declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

SCENARIOS

Clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Research analysis for L06 - HyperAbilities and Competence Composition: formulate the null that a simpler kernel without this scenarios function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

EVIDENCE GRADES

E0 idea through E5 robust independent support; this atlas does not auto-promote. Layer analysis for L06 - HyperAbilities and Competence Composition: convert evidence grades into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L06 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ABLATIONS

Remove L06, replace it with a simpler rule and vary each dependency. Layer analysis for L06 - HyperAbilities and Competence Composition: convert ablations into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

METRICS

Primary: composition gain, interface defects, transfer. Secondary: cost, latency, calibration, safety and recovery. Research analysis for L06 - HyperAbilities and Competence Composition: formulate the null that a simpler kernel without this metrics function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

REPLICATION

Release schemas, configs, tasks, seeds, traces and negative results where authorized. Interface analysis for L06 - HyperAbilities and Competence Composition: replication declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L06

Trigger	Name the condition that activates L06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L06 - HyperAbilities and Competence Composition.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L06 - HyperAbilities and Competence Composition: Implementation Roadmap

MINIMAL SLICE

Implement the smallest runnable L06 object and connect it to the evidence ledger. Research analysis for L06 - HyperAbilities and Competence Composition: formulate the null that a simpler kernel without this minimal slice function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

BENCHMARK GATE

Demonstrate improvement in composition gain, interface defects, transfer under matched conditions. Governance analysis for L06 - HyperAbilities and Competence Composition: benchmark gate is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPEN GAPS

Track missing code, simulated telemetry, untested interfaces and unresolved definitions. Layer analysis for L06 - HyperAbilities and Competence Composition: convert open gaps into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L06 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

CONNECTION GATE

Prove upstream/downstream integration and state reconciliation. Layer analysis for L06 - HyperAbilities and Competence Composition: convert connection gate into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

PROMOTION GATE

Require security, recovery, transfer and human-authority review. Governance analysis for L06 - HyperAbilities and Competence Composition: promotion gate is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

NEXT RELEASE

Promote L06 only when artifact, tests and evidence status agree. Governance analysis for L06 - HyperAbilities and Competence Composition: next release is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L06

Trigger	Name the condition that activates L06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L06 - HyperAbilities and Competence Composition.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L07 - Bounded HyperLoops and MCTS: Thesis and Boundary

LAYER THESIS

Bounded HyperLoops and MCTS owns iterative search with evidence-gain objectives, budgets and stop rules. Its primary artifact is bounded loop record. The layer is part of the proposed L00-L11 MOUSSAIF XT kernel architecture. Research analysis for L07 - Bounded HyperLoops and MCTS: formulate the null that a simpler kernel without this layer thesis function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

BOUNDARY

L07 is skipped for tasks where its artifact is unnecessary. It does not by itself prove AGI, safety or consciousness. Interface analysis for L07 - Bounded HyperLoops and MCTS: boundary declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

STATUS DISCIPLINE

Specify PROPOSED, PROTOTYPED, CONNECTED, BENCHMARKED or REPLICATED separately. Interface analysis for L07 - Bounded HyperLoops and MCTS: status discipline declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L07 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

UNIQUE RESPONSIBILITY

The layer must expose value not already supplied by MBHL, MCTS, xt-evaluation-service. The object changes a route, state, action or verification result. Layer analysis for L07 - Bounded HyperLoops and MCTS: convert unique responsibility into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

RESEARCH QUESTIONS

Does L07 improve convergence, evidence gain, cost, timeout rate under matched budgets? Does removal reveal a unique causal difference? Interface analysis for L07 - Bounded HyperLoops and MCTS: research questions declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

KERNEL ROLE

L07 participates in constitution-to-world-effect closure and remains independently disableable. Layer analysis for L07 - Bounded HyperLoops and MCTS: convert kernel role into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L07

Trigger	Name the condition that activates L07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L07 - Bounded HyperLoops and MCTS.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L07 - Bounded HyperLoops and MCTS: Objects and Schemas

SCHEMAS

Primary schema: bounded loop record; include task, state, version, authority, evidence, postcondition and residual uncertainty. Governance analysis for L07 - Bounded HyperLoops and MCTS: schemas is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OUTPUTS

Outputs feed downstream planning, routing, tools, courts, memory or learning according to L07. Governance analysis for L07 - Bounded HyperLoops and MCTS: outputs is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

VERSIONING

Schema migration preserves semantic meaning and supports replay of historical traces. Governance analysis for L07 - Bounded HyperLoops and MCTS: versioning is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L07 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

INPUTS

Inputs arrive from upstream kernel layers and MBHL, MCTS, xt-evaluation-service; freshness and provenance are mandatory. Research analysis for L07 - Bounded HyperLoops and MCTS: formulate the null that a simpler kernel without this inputs function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

INVARIANTS

Observed, inferred, intended, simulated and unknown state remain distinct. No silent privilege escalation. Research analysis for L07 - Bounded HyperLoops and MCTS: formulate the null that a simpler kernel without this invariants function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

ARTIFACT TEST

Reject malformed, incomplete, stale, unauthorized or causally inert objects. Interface analysis for L07 - Bounded HyperLoops and MCTS: artifact test declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX L07

Trigger	Name the condition that activates L07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L07 - Bounded HyperLoops and MCTS.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L07 - Bounded HyperLoops and MCTS: Runtime Algorithm

RUNTIME PATH

Trigger -> validate -> retrieve -> transform -> verify -> emit bounded loop record -> reconcile -> ledger. Research analysis for L07 - Bounded HyperLoops and MCTS: formulate the null that a simpler kernel without this runtime path function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

BUDGETS

Declare tokens, time, tool calls, loop count and escalation ceiling. Governance analysis for L07 - Bounded HyperLoops and MCTS: budgets is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

FALLBACK

Degrade safely when models, knowledge, tools or services are unavailable. Interface analysis for L07 - Bounded HyperLoops and MCTS: fallback declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L07 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ROUTING

Load the smallest sufficient model, knowledge, skills and tools for L07. Interface analysis for L07 - Bounded HyperLoops and MCTS: routing declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

CONCURRENCY

Define idempotency, conflict, ordering, cancellation and partial-completion semantics. Layer analysis for L07 - Bounded HyperLoops and MCTS: convert concurrency into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

STOP CONDITIONS

Stop on success, saturation, budget, risk, revoked authority or failed postcondition. Interface analysis for L07 - Bounded HyperLoops and MCTS: stop conditions declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L07

Trigger	Name the condition that activates L07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L07 - Bounded HyperLoops and MCTS.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L07 - Bounded HyperLoops and MCTS: Interfaces and Contracts

UPSTREAM INTERFACES

MBHL, MCTS, xt-evaluation-service and prior layer objects provide validated state to L07. Governance analysis for L07 - Bounded HyperLoops and MCTS: upstream interfaces is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

SERVICE MAPPING

Map L07 to one or more xt-* services without hiding ownership. Governance analysis for L07 - Bounded HyperLoops and MCTS: service mapping is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

PROTOCOL MAPPING

CLI, MCP and REST representations preserve equivalent semantics. Layer analysis for L07 - Bounded HyperLoops and MCTS: convert protocol mapping into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L07 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DOWNSTREAM INTERFACES

Consumers receive typed objects, never ambiguous prose-only handoffs. Research analysis for L07 - Bounded HyperLoops and MCTS: formulate the null that a simpler kernel without this downstream interfaces function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

AGENT MAPPING

Agents activate the layer through mission contracts, not direct global state mutation. Interface analysis for L07 - Bounded HyperLoops and MCTS: agent mapping declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

INTEGRATION TEST

Test missing, duplicate, delayed, conflicting and reordered messages. Research analysis for L07 - Bounded HyperLoops and MCTS: formulate the null that a simpler kernel without this integration test function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX

L07

Trigger	Name the condition that activates L07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L07 - Bounded HyperLoops and MCTS.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L07 - Bounded HyperLoops and MCTS: Security and Authority

THREAT MODEL

Attack L07 through spoofed state, injection, stale evidence, permission confusion and resource exhaustion. Governance analysis for L07 - Bounded HyperLoops and MCTS: threat model is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

DATA CONTROLS

Minimize, scope, encrypt, retain and delete data according to class and purpose. Layer analysis for L07 - Bounded HyperLoops and MCTS: convert data controls into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

AUDIT

Log identifiers, decisions and postconditions without exposing secrets. Interface analysis for L07 - Bounded HyperLoops and MCTS: audit declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L07 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

AUTHORIZATION

Classify actions T0-T4 and recheck authority at mutation time. Governance analysis for L07 - Bounded HyperLoops and MCTS: authorization is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

SANDBOXING

Untrusted execution is isolated with bounded filesystem, process and network capabilities. Governance analysis for L07 - Bounded HyperLoops and MCTS: sandboxing is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

SECURITY TESTS

Include malicious payload, revoked credential, path manipulation and recovery. Interface analysis for L07 - Bounded HyperLoops and MCTS: security tests declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L07

Trigger	Name the condition that activates L07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L07 - Bounded HyperLoops and MCTS.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L07 - Bounded HyperLoops and MCTS: Failure and Recovery

FAILURE TAXONOMY

L07 can fail by wrong trigger, invalid object, stale state, dependency error or false success. Governance analysis for L07 - Bounded HyperLoops and MCTS: failure taxonomy is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

CONTAINMENT

Stop downstream actions and preserve evidence when critical invariants fail. Layer analysis for L07 - Bounded HyperLoops and MCTS: convert containment into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

LEARNING BOUNDARY

A failure trace is not promoted to memory or training until verified and de-identified. Layer analysis for L07 - Bounded HyperLoops and MCTS: convert learning boundary into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L07 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DETECTION

Monitor convergence, evidence gain, cost, timeout rate, schema validity, drift and unclosed world effects. Governance analysis for L07 - Bounded HyperLoops and MCTS: detection is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

RECOVERY

Restore from checkpoint, replay safe state and report residual mutation. Governance analysis for L07 - Bounded HyperLoops and MCTS: recovery is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

INCIDENT OUTPUT

Emit root cause hypothesis, evidence, action, recovery and prevention record. Governance analysis for L07 - Bounded HyperLoops and MCTS: incident output is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L07

Trigger	Name the condition that activates L07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L07 - Bounded HyperLoops and MCTS.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L07 - Bounded HyperLoops and MCTS: Benchmarks and Ablations

BASELINES

Compare prompt-only, monolithic agent and full kernel without this layer. Research analysis for L07 - Bounded HyperLoops and MCTS: formulate the null that a simpler kernel without this baselines function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

SCENARIOS

Clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Governance analysis for L07 - Bounded HyperLoops and MCTS: scenarios is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

EVIDENCE GRADES

E0 idea through E5 robust independent support; this atlas does not auto-promote. Interface analysis for L07 - Bounded HyperLoops and MCTS: evidence grades declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L07 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ABLATIONS

Remove L07, replace it with a simpler rule and vary each dependency. Interface analysis for L07 - Bounded HyperLoops and MCTS: ablations declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

METRICS

Primary: convergence, evidence gain, cost, timeout rate. Secondary: cost, latency, calibration, safety and recovery. Governance analysis for L07 - Bounded HyperLoops and MCTS: metrics is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

REPLICATION

Release schemas, configs, tasks, seeds, traces and negative results where authorized. Research analysis for L07 - Bounded HyperLoops and MCTS: formulate the null that a simpler kernel without this replication function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX

L07

Trigger	Name the condition that activates L07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L07 - Bounded HyperLoops and MCTS.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L07 - Bounded HyperLoops and MCTS: Implementation Roadmap

MINIMAL SLICE

Implement the smallest runnable L07 object and connect it to the evidence ledger. Governance analysis for L07 - Bounded HyperLoops and MCTS: minimal slice is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

BENCHMARK GATE

Demonstrate improvement in convergence, evidence gain, cost, timeout rate under matched conditions. Layer analysis for L07 - Bounded HyperLoops and MCTS: convert benchmark gate into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPEN GAPS

Track missing code, simulated telemetry, untested interfaces and unresolved definitions. Interface analysis for L07 - Bounded HyperLoops and MCTS: open gaps declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L07 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

CONNECTION GATE

Prove upstream/downstream integration and state reconciliation. Interface analysis for L07 - Bounded HyperLoops and MCTS: connection gate declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

PROMOTION GATE

Require security, recovery, transfer and human-authority review. Layer analysis for L07 - Bounded HyperLoops and MCTS: convert promotion gate into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

NEXT RELEASE

Promote L07 only when artifact, tests and evidence status agree. Layer analysis for L07 - Bounded HyperLoops and MCTS: convert next release into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L07

Trigger	Name the condition that activates L07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L07 - Bounded HyperLoops and MCTS.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L08 - HyperAgents, Swarm and Mission DAG: Thesis and Boundary

LAYER THESIS

HyperAgents, Swarm and Mission DAG owns delegating bounded missions to specialist agents with merge control. Its primary artifact is agent mission DAG and handoff capsules. The layer is part of the proposed L00-L11 MOUSSAIF XT kernel architecture. Layer analysis for L08 - HyperAgents, Swarm and Mission DAG: convert layer thesis into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

BOUNDARY

L08 is skipped for tasks where its artifact is unnecessary. It does not by itself prove AGI, safety or consciousness. Governance analysis for L08 - HyperAgents, Swarm and Mission DAG: boundary is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

STATUS DISCIPLINE

Specify PROPOSED, PROTOTYPED, CONNECTED, BENCHMARKED or REPLICATED separately. Governance analysis for L08 - HyperAgents, Swarm and Mission DAG: status discipline is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L08 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

UNIQUE RESPONSIBILITY

The layer must expose value not already supplied by MHSO, MTPG, xt-agent-manager. The object changes a route, state, action or verification result. Research analysis for L08 - HyperAgents, Swarm and Mission DAG: formulate the null that a simpler kernel without this unique responsibility function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

RESEARCH QUESTIONS

Does L08 improve parallel gain, coordination loss, merge defects under matched budgets? Does removal reveal a unique causal difference? Governance analysis for L08 - HyperAgents, Swarm and Mission DAG: research questions is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

KERNEL ROLE

L08 participates in constitution-to-world-effect closure and remains independently disableable. Research analysis for L08 - HyperAgents, Swarm and Mission DAG: formulate the null that a simpler kernel without this kernel role function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX — L08

Trigger	Name the condition that activates L08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L08 - HyperAgents, Swarm and Mission DAG.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L08 - HyperAgents, Swarm and Mission DAG: Objects and Schemas

SCHEMAS

Primary schema: agent mission DAG and handoff capsules; include task, state, version, authority, evidence, postcondition and residual uncertainty. Interface analysis for L08 - HyperAgents, Swarm and Mission DAG: schemas declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OUTPUTS

Outputs feed downstream planning, routing, tools, courts, memory or learning according to L08. Interface analysis for L08 - HyperAgents, Swarm and Mission DAG: outputs declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

VERSIONING

Schema migration preserves semantic meaning and supports replay of historical traces. Interface analysis for L08 - HyperAgents, Swarm and Mission DAG: versioning declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L08 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

INPUTS

Inputs arrive from upstream kernel layers and MHSO, MTPG, xt-agent-manager; freshness and provenance are mandatory. Layer analysis for L08 - HyperAgents, Swarm and Mission DAG: convert inputs into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

INVARIANTS

Observed, inferred, intended, simulated and unknown state remain distinct. No silent privilege escalation. Layer analysis for L08 - HyperAgents, Swarm and Mission DAG: convert invariants into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

ARTIFACT TEST

Reject malformed, incomplete, stale, unauthorized or causally inert objects. Governance analysis for L08 - HyperAgents, Swarm and Mission DAG: artifact test is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L08

Trigger	Name the condition that activates L08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L08 - HyperAgents, Swarm and Mission DAG.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L08 - HyperAgents, Swarm and Mission DAG: Runtime Algorithm

RUNTIME PATH

Trigger -> validate -> retrieve -> transform -> verify -> emit agent mission DAG and handoff capsules -> reconcile -> ledger. Layer analysis for L08 - HyperAgents, Swarm and Mission DAG: convert runtime path into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

BUDGETS

Declare tokens, time, tool calls, loop count and escalation ceiling. Interface analysis for L08 - HyperAgents, Swarm and Mission DAG: budgets declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

FALLBACK

Degrade safely when models, knowledge, tools or services are unavailable. Governance analysis for L08 - HyperAgents, Swarm and Mission DAG: fallback is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L08 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ROUTING

Load the smallest sufficient model, knowledge, skills and tools for L08. Governance analysis for L08 - HyperAgents, Swarm and Mission DAG: routing is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

CONCURRENCY

Define idempotency, conflict, ordering, cancellation and partial-completion semantics. Research analysis for L08 - HyperAgents, Swarm and Mission DAG: formulate the null that a simpler kernel without this concurrency function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

STOP CONDITIONS

Stop on success, saturation, budget, risk, revoked authority or failed postcondition. Governance analysis for L08 - HyperAgents, Swarm and Mission DAG: stop conditions is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L08

Trigger	Name the condition that activates L08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L08 - HyperAgents, Swarm and Mission DAG.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L08 - HyperAgents, Swarm and Mission DAG: Interfaces and Contracts

UPSTREAM INTERFACES

MHSO, MTPG, xt-agent-manager and prior layer objects provide validated state to L08. Interface analysis for L08 - HyperAgents, Swarm and Mission DAG: upstream interfaces declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

SERVICE MAPPING

Map L08 to one or more xt-* services without hiding ownership. Interface analysis for L08 - HyperAgents, Swarm and Mission DAG: service mapping declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

PROTOCOL MAPPING

CLI, MCP and REST representations preserve equivalent semantics. Research analysis for L08 - HyperAgents, Swarm and Mission DAG: formulate the null that a simpler kernel without this protocol mapping function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L08 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DOWNSTREAM INTERFACES

Consumers receive typed objects, never ambiguous prose-only handoffs. Layer analysis for L08 - HyperAgents, Swarm and Mission DAG: convert downstream interfaces into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

AGENT MAPPING

Agents activate the layer through mission contracts, not direct global state mutation. Governance analysis for L08 - HyperAgents, Swarm and Mission DAG: agent mapping is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

INTEGRATION TEST

Test missing, duplicate, delayed, conflicting and reordered messages. Layer analysis for L08 - HyperAgents, Swarm and Mission DAG: convert integration test into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L08

Trigger	Name the condition that activates L08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L08 - HyperAgents, Swarm and Mission DAG.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L08 - HyperAgents, Swarm and Mission DAG: Security and Authority

THREAT MODEL

Attack L08 through spoofed state, injection, stale evidence, permission confusion and resource exhaustion. Interface analysis for L08 - HyperAgents, Swarm and Mission DAG: threat model declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

DATA CONTROLS

Minimize, scope, encrypt, retain and delete data according to class and purpose. Research analysis for L08 - HyperAgents, Swarm and Mission DAG: formulate the null that a simpler kernel without this data controls function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

AUDIT

Log identifiers, decisions and postconditions without exposing secrets. Governance analysis for L08 - HyperAgents, Swarm and Mission DAG: audit is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L08 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

AUTHORIZATION

Classify actions T0-T4 and recheck authority at mutation time. Interface analysis for L08 - HyperAgents, Swarm and Mission DAG: authorization declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

SANDBOXING

Untrusted execution is isolated with bounded filesystem, process and network capabilities. Interface analysis for L08 - HyperAgents, Swarm and Mission DAG: sandboxing declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

SECURITY TESTS

Include malicious payload, revoked credential, path manipulation and recovery. Governance analysis for L08 - HyperAgents, Swarm and Mission DAG: security tests is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L08

Trigger	Name the condition that activates L08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L08 - HyperAgents, Swarm and Mission DAG.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L08 - HyperAgents, Swarm and Mission DAG: Failure and Recovery

FAILURE TAXONOMY

L08 can fail by wrong trigger, invalid object, stale state, dependency error or false success. Interface analysis for L08 - HyperAgents, Swarm and Mission DAG: failure taxonomy declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

CONTAINMENT

Stop downstream actions and preserve evidence when critical invariants fail. Research analysis for L08 - HyperAgents, Swarm and Mission DAG: formulate the null that a simpler kernel without this containment function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

LEARNING BOUNDARY

A failure trace is not promoted to memory or training until verified and de-identified. Research analysis for L08 - HyperAgents, Swarm and Mission DAG: formulate the null that a simpler kernel without this learning boundary function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L08 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DETECTION

Monitor parallel gain, coordination loss, merge defects, schema validity, drift and unclosed world effects. Interface analysis for L08 - HyperAgents, Swarm and Mission DAG: detection declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

RECOVERY

Restore from checkpoint, replay safe state and report residual mutation. Interface analysis for L08 - HyperAgents, Swarm and Mission DAG: recovery declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

INCIDENT OUTPUT

Emit root cause hypothesis, evidence, action, recovery and prevention record. Interface analysis for L08 - HyperAgents, Swarm and Mission DAG: incident output declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L08

Trigger	Name the condition that activates L08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L08 - HyperAgents, Swarm and Mission DAG.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L08 - HyperAgents, Swarm and Mission DAG: Benchmarks and Ablations

BASELINES

Compare prompt-only, monolithic agent and full kernel without this layer. Layer analysis for L08 - HyperAgents, Swarm and Mission DAG: convert baselines into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

SCENARIOS

Clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Interface analysis for L08 - HyperAgents, Swarm and Mission DAG: scenarios declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

EVIDENCE GRADES

E0 idea through E5 robust independent support; this atlas does not auto-promote. Governance analysis for L08 - HyperAgents, Swarm and Mission DAG: evidence grades is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L08 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ABLATIONS

Remove L08, replace it with a simpler rule and vary each dependency. Governance analysis for L08 - HyperAgents, Swarm and Mission DAG: ablations is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

METRICS

Primary: parallel gain, coordination loss, merge defects. Secondary: cost, latency, calibration, safety and recovery. Interface analysis for L08 - HyperAgents, Swarm and Mission DAG: metrics declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

REPLICATION

Release schemas, configs, tasks, seeds, traces and negative results where authorized. Layer analysis for L08 - HyperAgents, Swarm and Mission DAG: convert replication into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L08

Trigger	Name the condition that activates L08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L08 - HyperAgents, Swarm and Mission DAG.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L08 - HyperAgents, Swarm and Mission DAG: Implementation Roadmap

MINIMAL SLICE

Implement the smallest runnable L08 object and connect it to the evidence ledger. Interface analysis for L08 - HyperAgents, Swarm and Mission DAG: minimal slice declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

BENCHMARK GATE

Demonstrate improvement in parallel gain, coordination loss, merge defects under matched conditions. Research analysis for L08 - HyperAgents, Swarm and Mission DAG: formulate the null that a simpler kernel without this benchmark gate function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPEN GAPS

Track missing code, simulated telemetry, untested interfaces and unresolved definitions. Governance analysis for L08 - HyperAgents, Swarm and Mission DAG: open gaps is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L08 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

CONNECTION GATE

Prove upstream/downstream integration and state reconciliation. Governance analysis for L08 - HyperAgents, Swarm and Mission DAG: connection gate is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

PROMOTION GATE

Require security, recovery, transfer and human-authority review. Research analysis for L08 - HyperAgents, Swarm and Mission DAG: formulate the null that a simpler kernel without this promotion gate function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

NEXT RELEASE

Promote L08 only when artifact, tests and evidence status agree. Research analysis for L08 - HyperAgents, Swarm and Mission DAG: formulate the null that a simpler kernel without this next release function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX

L08

Trigger	Name the condition that activates L08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L08 - HyperAgents, Swarm and Mission DAG.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L09 - Host Adapters, Tools, MCP and Gateways: Thesis and Boundary

LAYER THESIS

Host Adapters, Tools, MCP and Gateways owns connecting models and agents to typed local and external capabilities. Its primary artifact is tool call, gateway response and reconciled state. The layer is part of the proposed L00-L11 MOUSSAIF XT kernel architecture. Governance analysis for L09 - Host Adapters, Tools, MCP and Gateways: layer thesis is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

BOUNDARY

L09 is skipped for tasks where its artifact is unnecessary. It does not by itself prove AGI, safety or consciousness. Research analysis for L09 - Host Adapters, Tools, MCP and Gateways: formulate the null that a simpler kernel without this boundary function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

STATUS DISCIPLINE

Specify PROPOSED, PROTOTYPED, CONNECTED, BENCHMARKED or REPLICATED separately. Research analysis for L09 - Host Adapters, Tools, MCP and Gateways: formulate the null that a simpler kernel without this status discipline function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L09 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

UNIQUE RESPONSIBILITY

The layer must expose value not already supplied by MTIT, MCP, REST :8443, xt-tool-gateway. The object changes a route, state, action or verification result. Interface analysis for L09 - Host Adapters, Tools, MCP and Gateways: unique responsibility declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

RESEARCH QUESTIONS

Does L09 improve tool success, misuse, latency, postcondition pass under matched budgets? Does removal reveal a unique causal difference? Research analysis for L09 - Host Adapters, Tools, MCP and Gateways: formulate the null that a simpler kernel without this research questions function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

KERNEL ROLE

L09 participates in constitution-to-world-effect closure and remains independently disableable. Interface analysis for L09 - Host Adapters, Tools, MCP and Gateways: kernel role declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L09

Trigger	Name the condition that activates L09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L09 - Host Adapters, Tools, MCP and Gateways.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L09 - Host Adapters, Tools, MCP and Gateways: Objects and Schemas

SCHEMAS

Primary schema: tool call, gateway response and reconciled state; include task, state, version, authority, evidence, postcondition and residual uncertainty. Layer analysis for L09 - Host Adapters, Tools, MCP and Gateways: convert schemas into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OUTPUTS

Outputs feed downstream planning, routing, tools, courts, memory or learning according to L09. Layer analysis for L09 - Host Adapters, Tools, MCP and Gateways: convert outputs into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

VERSIONING

Schema migration preserves semantic meaning and supports replay of historical traces. Layer analysis for L09 - Host Adapters, Tools, MCP and Gateways: convert versioning into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L09 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

INPUTS

Inputs arrive from upstream kernel layers and MTIT, MCP, REST :8443, xt-tool-gateway; freshness and provenance are mandatory. Governance analysis for L09 - Host Adapters, Tools, MCP and Gateways: inputs is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

INVARIANTS

Observed, inferred, intended, simulated and unknown state remain distinct. No silent privilege escalation. Governance analysis for L09 - Host Adapters, Tools, MCP and Gateways: invariants is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

ARTIFACT TEST

Reject malformed, incomplete, stale, unauthorized or causally inert objects. Research analysis for L09 - Host Adapters, Tools, MCP and Gateways: formulate the null that a simpler kernel without this artifact test function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX L09

Trigger	Name the condition that activates L09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L09 - Host Adapters, Tools, MCP and Gateways.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L09 - Host Adapters, Tools, MCP and Gateways: Runtime Algorithm

RUNTIME PATH

Trigger -> validate -> retrieve -> transform -> verify -> emit tool call, gateway response and reconciled state -> reconcile -> ledger. Governance analysis for L09 - Host Adapters, Tools, MCP and Gateways: runtime path is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

BUDGETS

Declare tokens, time, tool calls, loop count and escalation ceiling. Layer analysis for L09 - Host Adapters, Tools, MCP and Gateways: convert budgets into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

FALLBACK

Degrade safely when models, knowledge, tools or services are unavailable. Research analysis for L09 - Host Adapters, Tools, MCP and Gateways: formulate the null that a simpler kernel without this fallback function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L09 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ROUTING

Load the smallest sufficient model, knowledge, skills and tools for L09. Research analysis for L09 - Host Adapters, Tools, MCP and Gateways: formulate the null that a simpler kernel without this routing function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

CONCURRENCY

Define idempotency, conflict, ordering, cancellation and partial-completion semantics. Interface analysis for L09 - Host Adapters, Tools, MCP and Gateways: concurrency declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

STOP CONDITIONS

Stop on success, saturation, budget, risk, revoked authority or failed postcondition. Research analysis for L09 - Host Adapters, Tools, MCP and Gateways: formulate the null that a simpler kernel without this stop conditions function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX

L09

Trigger	Name the condition that activates L09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L09 - Host Adapters, Tools, MCP and Gateways.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L09 - Host Adapters, Tools, MCP and Gateways: Interfaces and Contracts

UPSTREAM INTERFACES

MTIT, MCP, REST :8443, xt-tool-gateway and prior layer objects provide validated state to L09. Layer analysis for L09 - Host Adapters, Tools, MCP and Gateways: convert upstream interfaces into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

SERVICE MAPPING

Map L09 to one or more xt-* services without hiding ownership. Layer analysis for L09 - Host Adapters, Tools, MCP and Gateways: convert service mapping into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

PROTOCOL MAPPING

CLI, MCP and REST representations preserve equivalent semantics. Interface analysis for L09 - Host Adapters, Tools, MCP and Gateways: protocol mapping declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L09 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DOWNSTREAM INTERFACES

Consumers receive typed objects, never ambiguous prose-only handoffs. Governance analysis for L09 - Host Adapters, Tools, MCP and Gateways: downstream interfaces is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

AGENT MAPPING

Agents activate the layer through mission contracts, not direct global state mutation. Research analysis for L09 - Host Adapters, Tools, MCP and Gateways: formulate the null that a simpler kernel without this agent mapping function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

INTEGRATION TEST

Test missing, duplicate, delayed, conflicting and reordered messages. Governance analysis for L09 - Host Adapters, Tools, MCP and Gateways: integration test is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX — L09

Trigger	Name the condition that activates L09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L09 - Host Adapters, Tools, MCP and Gateways.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L09 - Host Adapters, Tools, MCP and Gateways: Security and Authority

THREAT MODEL

Attack L09 through spoofed state, injection, stale evidence, permission confusion and resource exhaustion. Layer analysis for L09 - Host Adapters, Tools, MCP and Gateways: convert threat model into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

DATA CONTROLS

Minimize, scope, encrypt, retain and delete data according to class and purpose. Interface analysis for L09 - Host Adapters, Tools, MCP and Gateways: data controls declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

AUDIT

Log identifiers, decisions and postconditions without exposing secrets. Research analysis for L09 - Host Adapters, Tools, MCP and Gateways: formulate the null that a simpler kernel without this audit function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L09 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

AUTHORIZATION

Classify actions T0-T4 and recheck authority at mutation time. Layer analysis for L09 - Host Adapters, Tools, MCP and Gateways: convert authorization into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

SANDBOXING

Untrusted execution is isolated with bounded filesystem, process and network capabilities. Layer analysis for L09 - Host Adapters, Tools, MCP and Gateways: convert sandboxing into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

SECURITY TESTS

Include malicious payload, revoked credential, path manipulation and recovery. Research analysis for L09 - Host Adapters, Tools, MCP and Gateways: formulate the null that a simpler kernel without this security tests function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX

L09

Trigger	Name the condition that activates L09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L09 - Host Adapters, Tools, MCP and Gateways.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L09 - Host Adapters, Tools, MCP and Gateways: Failure and Recovery

FAILURE TAXONOMY

L09 can fail by wrong trigger, invalid object, stale state, dependency error or false success. Layer analysis for L09 - Host Adapters, Tools, MCP and Gateways: convert failure taxonomy into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

CONTAINMENT

Stop downstream actions and preserve evidence when critical invariants fail. Interface analysis for L09 - Host Adapters, Tools, MCP and Gateways: containment declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

LEARNING BOUNDARY

A failure trace is not promoted to memory or training until verified and de-identified. Interface analysis for L09 - Host Adapters, Tools, MCP and Gateways: learning boundary declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

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DETECTION

Monitor tool success, misuse, latency, postcondition pass, schema validity, drift and unclosed world effects. Layer analysis for L09 - Host Adapters, Tools, MCP and Gateways: convert detection into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

RECOVERY

Restore from checkpoint, replay safe state and report residual mutation. Layer analysis for L09 - Host Adapters, Tools, MCP and Gateways: convert recovery into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

INCIDENT OUTPUT

Emit root cause hypothesis, evidence, action, recovery and prevention record. Layer analysis for L09 - Host Adapters, Tools, MCP and Gateways: convert incident output into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L09

Trigger	Name the condition that activates L09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L09 - Host Adapters, Tools, MCP and Gateways.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L09 - Host Adapters, Tools, MCP and Gateways: Benchmarks and Ablations

BASELINES

Compare prompt-only, monolithic agent and full kernel without this layer. Governance analysis for L09 - Host Adapters, Tools, MCP and Gateways: baselines is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

SCENARIOS

Clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Layer analysis for L09 - Host Adapters, Tools, MCP and Gateways: convert scenarios into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

EVIDENCE GRADES

E0 idea through E5 robust independent support; this atlas does not auto-promote. Research analysis for L09 - Host Adapters, Tools, MCP and Gateways: formulate the null that a simpler kernel without this evidence grades function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

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ABLATIONS

Remove L09, replace it with a simpler rule and vary each dependency. Research analysis for L09 - Host Adapters, Tools, MCP and Gateways: formulate the null that a simpler kernel without this ablations function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

METRICS

Primary: tool success, misuse, latency, postcondition pass. Secondary: cost, latency, calibration, safety and recovery. Layer analysis for L09 - Host Adapters, Tools, MCP and Gateways: convert metrics into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

REPLICATION

Release schemas, configs, tasks, seeds, traces and negative results where authorized. Governance analysis for L09 - Host Adapters, Tools, MCP and Gateways: replication is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L09

Trigger	Name the condition that activates L09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L09 - Host Adapters, Tools, MCP and Gateways.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L09 - Host Adapters, Tools, MCP and Gateways: Implementation Roadmap

MINIMAL SLICE

Implement the smallest runnable L09 object and connect it to the evidence ledger. Layer analysis for L09 - Host Adapters, Tools, MCP and Gateways: convert minimal slice into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

BENCHMARK GATE

Demonstrate improvement in tool success, misuse, latency, postcondition pass under matched conditions. Interface analysis for L09 - Host Adapters, Tools, MCP and Gateways: benchmark gate declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPEN GAPS

Track missing code, simulated telemetry, untested interfaces and unresolved definitions. Research analysis for L09 - Host Adapters, Tools, MCP and Gateways: formulate the null that a simpler kernel without this open gaps function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L09 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

CONNECTION GATE

Prove upstream/downstream integration and state reconciliation. Research analysis for L09 - Host Adapters, Tools, MCP and Gateways: formulate the null that a simpler kernel without this connection gate function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

PROMOTION GATE

Require security, recovery, transfer and human-authority review. Interface analysis for L09 - Host Adapters, Tools, MCP and Gateways: promotion gate declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

NEXT RELEASE

Promote L09 only when artifact, tests and evidence status agree. Interface analysis for L09 - Host Adapters, Tools, MCP and Gateways: next release declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX

L09

Trigger	Name the condition that activates L09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L09 - Host Adapters, Tools, MCP and Gateways.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L10 - Verification, Courts and World Effect: Thesis and Boundary

LAYER THESIS

Verification, Courts and World Effect owns independent validation and proof that intended external state changed. Its primary artifact is court docket and world-effect closure. The layer is part of the proposed L00-L11 MOUSSAIF XT kernel architecture. Governance analysis for L10 - Verification, Courts and World Effect: layer thesis is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

BOUNDARY

L10 is skipped for tasks where its artifact is unnecessary. It does not by itself prove AGI, safety or consciousness. Research analysis for L10 - Verification, Courts and World Effect: formulate the null that a simpler kernel without this boundary function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

STATUS DISCIPLINE

Specify PROPOSED, PROTOTYPED, CONNECTED, BENCHMARKED or REPLICATED separately. Research analysis for L10 - Verification, Courts and World Effect: formulate the null that a simpler kernel without this status discipline function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

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UNIQUE RESPONSIBILITY

The layer must expose value not already supplied by MDFC, MGFC, xt-verifier, xt-world-effect. The object changes a route, state, action or verification result. Interface analysis for L10 - Verification, Courts and World Effect: unique responsibility declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

RESEARCH QUESTIONS

Does L10 improve false-success rate, defect recall, unsafe action, recovery under matched budgets? Does removal reveal a unique causal difference? Research analysis for L10 - Verification, Courts and World Effect: formulate the null that a simpler kernel without this research questions function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

KERNEL ROLE

L10 participates in constitution-to-world-effect closure and remains independently disableable. Interface analysis for L10 - Verification, Courts and World Effect: kernel role declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX L10

Trigger	Name the condition that activates L10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L10 - Verification, Courts and World Effect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L10 - Verification, Courts and World Effect: Objects and Schemas

SCHEMAS

Primary schema: court docket and world-effect closure; include task, state, version, authority, evidence, postcondition and residual uncertainty. Layer analysis for L10 - Verification, Courts and World Effect: convert schemas into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OUTPUTS

Outputs feed downstream planning, routing, tools, courts, memory or learning according to L10. Layer analysis for L10 - Verification, Courts and World Effect: convert outputs into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

VERSIONING

Schema migration preserves semantic meaning and supports replay of historical traces. Layer analysis for L10 - Verification, Courts and World Effect: convert versioning into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

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INPUTS

Inputs arrive from upstream kernel layers and MDFC, MGFC, xt-verifier, xt-world-effect; freshness and provenance are mandatory. Governance analysis for L10 - Verification, Courts and World Effect: inputs is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

INVARIANTS

Observed, inferred, intended, simulated and unknown state remain distinct. No silent privilege escalation. Governance analysis for L10 - Verification, Courts and World Effect: invariants is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

ARTIFACT TEST

Reject malformed, incomplete, stale, unauthorized or causally inert objects. Research analysis for L10 - Verification, Courts and World Effect: formulate the null that a simpler kernel without this artifact test function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX

L10

Trigger	Name the condition that activates L10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L10 - Verification, Courts and World Effect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L10 - Verification, Courts and World Effect: Runtime Algorithm

RUNTIME PATH

Trigger -> validate -> retrieve -> transform -> verify -> emit court docket and world-effect closure -> reconcile -> ledger. Governance analysis for L10 - Verification, Courts and World Effect: runtime path is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

BUDGETS

Declare tokens, time, tool calls, loop count and escalation ceiling. Layer analysis for L10 - Verification, Courts and World Effect: convert budgets into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

FALLBACK

Degrade safely when models, knowledge, tools or services are unavailable. Research analysis for L10 - Verification, Courts and World Effect: formulate the null that a simpler kernel without this fallback function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L10 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ROUTING

Load the smallest sufficient model, knowledge, skills and tools for L10. Research analysis for L10 - Verification, Courts and World Effect: formulate the null that a simpler kernel without this routing function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

CONCURRENCY

Define idempotency, conflict, ordering, cancellation and partial-completion semantics. Interface analysis for L10 - Verification, Courts and World Effect: concurrency declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

STOP CONDITIONS

Stop on success, saturation, budget, risk, revoked authority or failed postcondition. Research analysis for L10 - Verification, Courts and World Effect: formulate the null that a simpler kernel without this stop conditions function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX — L10

Trigger	Name the condition that activates L10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L10 - Verification, Courts and World Effect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L10 - Verification, Courts and World Effect: Interfaces and Contracts

UPSTREAM INTERFACES

MDFC, MGFC, xt-verifier, xt-world-effect and prior layer objects provide validated state to L10. Layer analysis for L10 - Verification, Courts and World Effect: convert upstream interfaces into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

SERVICE MAPPING

Map L10 to one or more xt-* services without hiding ownership. Layer analysis for L10 - Verification, Courts and World Effect: convert service mapping into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

PROTOCOL MAPPING

CLI, MCP and REST representations preserve equivalent semantics. Interface analysis for L10 - Verification, Courts and World Effect: protocol mapping declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L10 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DOWNSTREAM INTERFACES

Consumers receive typed objects, never ambiguous prose-only handoffs. Governance analysis for L10 - Verification, Courts and World Effect: downstream interfaces is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

AGENT MAPPING

Agents activate the layer through mission contracts, not direct global state mutation. Research analysis for L10 - Verification, Courts and World Effect: formulate the null that a simpler kernel without this agent mapping function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

INTEGRATION TEST

Test missing, duplicate, delayed, conflicting and reordered messages. Governance analysis for L10 - Verification, Courts and World Effect: integration test is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX L10

Trigger	Name the condition that activates L10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L10 - Verification, Courts and World Effect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L10 - Verification, Courts and World Effect: Security and Authority

THREAT MODEL

Attack L10 through spoofed state, injection, stale evidence, permission confusion and resource exhaustion. Layer analysis for L10 - Verification, Courts and World Effect: convert threat model into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

DATA CONTROLS

Minimize, scope, encrypt, retain and delete data according to class and purpose. Interface analysis for L10 - Verification, Courts and World Effect: data controls declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

AUDIT

Log identifiers, decisions and postconditions without exposing secrets. Research analysis for L10 - Verification, Courts and World Effect: formulate the null that a simpler kernel without this audit function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L10 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

AUTHORIZATION

Classify actions T0-T4 and recheck authority at mutation time. Layer analysis for L10 - Verification, Courts and World Effect: convert authorization into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

SANDBOXING

Untrusted execution is isolated with bounded filesystem, process and network capabilities. Layer analysis for L10 - Verification, Courts and World Effect: convert sandboxing into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

SECURITY TESTS

Include malicious payload, revoked credential, path manipulation and recovery. Research analysis for L10 - Verification, Courts and World Effect: formulate the null that a simpler kernel without this security tests function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX

L10

Trigger	Name the condition that activates L10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L10 - Verification, Courts and World Effect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L10 - Verification, Courts and World Effect: Failure and Recovery

FAILURE TAXONOMY

L10 can fail by wrong trigger, invalid object, stale state, dependency error or false success. Layer analysis for L10 - Verification, Courts and World Effect: convert failure taxonomy into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

CONTAINMENT

Stop downstream actions and preserve evidence when critical invariants fail. Interface analysis for L10 - Verification, Courts and World Effect: containment declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

LEARNING BOUNDARY

A failure trace is not promoted to memory or training until verified and de-identified. Interface analysis for L10 - Verification, Courts and World Effect: learning boundary declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

L10 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DETECTION

Monitor false-success rate, defect recall, unsafe action, recovery, schema validity, drift and unclosed world effects. Layer analysis for L10 - Verification, Courts and World Effect: convert detection into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

RECOVERY

Restore from checkpoint, replay safe state and report residual mutation. Layer analysis for L10 - Verification, Courts and World Effect: convert recovery into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

INCIDENT OUTPUT

Emit root cause hypothesis, evidence, action, recovery and prevention record. Layer analysis for L10 - Verification, Courts and World Effect: convert incident output into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX

L10

Trigger	Name the condition that activates L10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L10 - Verification, Courts and World Effect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L10 - Verification, Courts and World Effect: Benchmarks and Ablations

BASELINES

Compare prompt-only, monolithic agent and full kernel without this layer. Governance analysis for L10 - Verification, Courts and World Effect: baselines is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

SCENARIOS

Clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Layer analysis for L10 - Verification, Courts and World Effect: convert scenarios into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

EVIDENCE GRADES

E0 idea through E5 robust independent support; this atlas does not auto-promote. Research analysis for L10 - Verification, Courts and World Effect: formulate the null that a simpler kernel without this evidence grades function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

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ABLATIONS

Remove L10, replace it with a simpler rule and vary each dependency. Research analysis for L10 - Verification, Courts and World Effect: formulate the null that a simpler kernel without this ablations function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

METRICS

Primary: false-success rate, defect recall, unsafe action, recovery. Secondary: cost, latency, calibration, safety and recovery. Layer analysis for L10 - Verification, Courts and World Effect: convert metrics into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

REPLICATION

Release schemas, configs, tasks, seeds, traces and negative results where authorized. Governance analysis for L10 - Verification, Courts and World Effect: replication is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L10

Trigger	Name the condition that activates L10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L10 - Verification, Courts and World Effect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L10 - Verification, Courts and World Effect: Implementation Roadmap

MINIMAL SLICE

Implement the smallest runnable L10 object and connect it to the evidence ledger. Layer analysis for L10 - Verification, Courts and World Effect: convert minimal slice into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

BENCHMARK GATE

Demonstrate improvement in false-success rate, defect recall, unsafe action, recovery under matched conditions. Interface analysis for L10 - Verification, Courts and World Effect: benchmark gate declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPEN GAPS

Track missing code, simulated telemetry, untested interfaces and unresolved definitions. Research analysis for L10 - Verification, Courts and World Effect: formulate the null that a simpler kernel without this open gaps function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L10 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

CONNECTION GATE

Prove upstream/downstream integration and state reconciliation. Research analysis for L10 - Verification, Courts and World Effect: formulate the null that a simpler kernel without this connection gate function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

PROMOTION GATE

Require security, recovery, transfer and human-authority review. Interface analysis for L10 - Verification, Courts and World Effect: promotion gate declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

NEXT RELEASE

Promote L10 only when artifact, tests and evidence status agree. Interface analysis for L10 - Verification, Courts and World Effect: next release declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX — L10

Trigger	Name the condition that activates L10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L10 - Verification, Courts and World Effect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L11 - Memory, Continual Learning and Observability: Thesis and Boundary

LAYER THESIS

Memory, Continual Learning and Observability owns consolidating validated memory, governed learning and replayable telemetry. Its primary artifact is memory promotion and learning proposal. The layer is part of the proposed L00-L11 MOUSSAIF XT kernel architecture. Interface analysis for L11 - Memory, Continual Learning and Observability: layer thesis declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

BOUNDARY

L11 is skipped for tasks where its artifact is unnecessary. It does not by itself prove AGI, safety or consciousness. Layer analysis for L11 - Memory, Continual Learning and Observability: convert boundary into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

STATUS DISCIPLINE

Specify PROPOSED, PROTOTYPED, CONNECTED, BENCHMARKED or REPLICATED separately. Layer analysis for L11 - Memory, Continual Learning and Observability: convert status discipline into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L11 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

UNIQUE RESPONSIBILITY

The layer must expose value not already supplied by MSMT, MGSET, xt-memory-service, xt-observability. The object changes a route, state, action or verification result. Governance analysis for L11 - Memory, Continual Learning and Observability: unique responsibility is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

RESEARCH QUESTIONS

Does L11 improve retention value, regression, drift, replay coverage under matched budgets? Does removal reveal a unique causal difference? Layer analysis for L11 - Memory, Continual Learning and Observability: convert research questions into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

KERNEL ROLE

L11 participates in constitution-to-world-effect closure and remains independently disableable. Governance analysis for L11 - Memory, Continual Learning and Observability: kernel role is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX

L11

Trigger	Name the condition that activates L11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L11 - Memory, Continual Learning and Observability.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L11 - Memory, Continual Learning and Observability: Objects and Schemas

SCHEMAS

Primary schema: memory promotion and learning proposal; include task, state, version, authority, evidence, postcondition and residual uncertainty. Research analysis for L11 - Memory, Continual Learning and Observability: formulate the null that a simpler kernel without this schemas function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OUTPUTS

Outputs feed downstream planning, routing, tools, courts, memory or learning according to L11. Research analysis for L11 - Memory, Continual Learning and Observability: formulate the null that a simpler kernel without this outputs function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

VERSIONING

Schema migration preserves semantic meaning and supports replay of historical traces. Research analysis for L11 - Memory, Continual Learning and Observability: formulate the null that a simpler kernel without this versioning function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

L11 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

INPUTS

Inputs arrive from upstream kernel layers and MSMT, MGSET, xt-memory-service, xt-observability; freshness and provenance are mandatory. Interface analysis for L11 - Memory, Continual Learning and Observability: inputs declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

INVARIANTS

Observed, inferred, intended, simulated and unknown state remain distinct. No silent privilege escalation. Interface analysis for L11 - Memory, Continual Learning and Observability: invariants declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

ARTIFACT TEST

Reject malformed, incomplete, stale, unauthorized or causally inert objects. Layer analysis for L11 - Memory, Continual Learning and Observability: convert artifact test into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX L11

Trigger	Name the condition that activates L11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L11 - Memory, Continual Learning and Observability.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L11 - Memory, Continual Learning and Observability: Runtime Algorithm

RUNTIME PATH

Trigger -> validate -> retrieve -> transform -> verify -> emit memory promotion and learning proposal -> reconcile -> ledger. Interface analysis for L11 - Memory, Continual Learning and Observability: runtime path declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

BUDGETS

Declare tokens, time, tool calls, loop count and escalation ceiling. Research analysis for L11 - Memory, Continual Learning and Observability: formulate the null that a simpler kernel without this budgets function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

FALLBACK

Degrade safely when models, knowledge, tools or services are unavailable. Layer analysis for L11 - Memory, Continual Learning and Observability: convert fallback into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L11 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ROUTING

Load the smallest sufficient model, knowledge, skills and tools for L11. Layer analysis for L11 - Memory, Continual Learning and Observability: convert routing into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

CONCURRENCY

Define idempotency, conflict, ordering, cancellation and partial-completion semantics. Governance analysis for L11 - Memory, Continual Learning and Observability: concurrency is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

STOP CONDITIONS

Stop on success, saturation, budget, risk, revoked authority or failed postcondition. Layer analysis for L11 - Memory, Continual Learning and Observability: convert stop conditions into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX L11

Trigger	Name the condition that activates L11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L11 - Memory, Continual Learning and Observability.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L11 - Memory, Continual Learning and Observability: Interfaces and Contracts

UPSTREAM INTERFACES

MSMT, MGSET, xt-memory-service, xt-observability and prior layer objects provide validated state to L11. Research analysis for L11 - Memory, Continual Learning and Observability: formulate the null that a simpler kernel without this upstream interfaces function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

SERVICE MAPPING

Map L11 to one or more xt-* services without hiding ownership. Research analysis for L11 - Memory, Continual Learning and Observability: formulate the null that a simpler kernel without this service mapping function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

PROTOCOL MAPPING

CLI, MCP and REST representations preserve equivalent semantics. Governance analysis for L11 - Memory, Continual Learning and Observability: protocol mapping is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L11 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DOWNSTREAM INTERFACES

Consumers receive typed objects, never ambiguous prose-only handoffs. Interface analysis for L11 - Memory, Continual Learning and Observability: downstream interfaces declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

AGENT MAPPING

Agents activate the layer through mission contracts, not direct global state mutation. Layer analysis for L11 - Memory, Continual Learning and Observability: convert agent mapping into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

INTEGRATION TEST

Test missing, duplicate, delayed, conflicting and reordered messages. Interface analysis for L11 - Memory, Continual Learning and Observability: integration test declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX L11

Trigger	Name the condition that activates L11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L11 - Memory, Continual Learning and Observability.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L11 - Memory, Continual Learning and Observability: Security and Authority

THREAT MODEL

Attack L11 through spoofed state, injection, stale evidence, permission confusion and resource exhaustion. Research analysis for L11 - Memory, Continual Learning and Observability: formulate the null that a simpler kernel without this threat model function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

DATA CONTROLS

Minimize, scope, encrypt, retain and delete data according to class and purpose. Governance analysis for L11 - Memory, Continual Learning and Observability: data controls is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

AUDIT

Log identifiers, decisions and postconditions without exposing secrets. Layer analysis for L11 - Memory, Continual Learning and Observability: convert audit into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L11 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

AUTHORIZATION

Classify actions T0-T4 and recheck authority at mutation time. Research analysis for L11 - Memory, Continual Learning and Observability: formulate the null that a simpler kernel without this authorization function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

SANDBOXING

Untrusted execution is isolated with bounded filesystem, process and network capabilities. Research analysis for L11 - Memory, Continual Learning and Observability: formulate the null that a simpler kernel without this sandboxing function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

SECURITY TESTS

Include malicious payload, revoked credential, path manipulation and recovery. Layer analysis for L11 - Memory, Continual Learning and Observability: convert security tests into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

OPERATIONAL EVIDENCE MATRIX L11

Trigger	Name the condition that activates L11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L11 - Memory, Continual Learning and Observability.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L11 - Memory, Continual Learning and Observability: Failure and Recovery

FAILURE TAXONOMY

L11 can fail by wrong trigger, invalid object, stale state, dependency error or false success. Research analysis for L11 - Memory, Continual Learning and Observability: formulate the null that a simpler kernel without this failure taxonomy function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

CONTAINMENT

Stop downstream actions and preserve evidence when critical invariants fail. Governance analysis for L11 - Memory, Continual Learning and Observability: containment is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

LEARNING BOUNDARY

A failure trace is not promoted to memory or training until verified and de-identified. Governance analysis for L11 - Memory, Continual Learning and Observability: learning boundary is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

L11 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

DETECTION

Monitor retention value, regression, drift, replay coverage, schema validity, drift and unclosed world effects. Research analysis for L11 - Memory, Continual Learning and Observability: formulate the null that a simpler kernel without this detection function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

RECOVERY

Restore from checkpoint, replay safe state and report residual mutation. Research analysis for L11 - Memory, Continual Learning and Observability: formulate the null that a simpler kernel without this recovery function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

INCIDENT OUTPUT

Emit root cause hypothesis, evidence, action, recovery and prevention record. Research analysis for L11 - Memory, Continual Learning and Observability: formulate the null that a simpler kernel without this incident output function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

OPERATIONAL EVIDENCE MATRIX L11

Trigger	Name the condition that activates L11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L11 - Memory, Continual Learning and Observability.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L11 - Memory, Continual Learning and Observability: Benchmarks and Ablations

BASELINES

Compare prompt-only, monolithic agent and full kernel without this layer. Interface analysis for L11 - Memory, Continual Learning and Observability: baselines declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

SCENARIOS

Clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Research analysis for L11 - Memory, Continual Learning and Observability: formulate the null that a simpler kernel without this scenarios function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

EVIDENCE GRADES

E0 idea through E5 robust independent support; this atlas does not auto-promote. Layer analysis for L11 - Memory, Continual Learning and Observability: convert evidence grades into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L11 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

ABLATIONS

Remove L11, replace it with a simpler rule and vary each dependency. Layer analysis for L11 - Memory, Continual Learning and Observability: convert ablations into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

METRICS

Primary: retention value, regression, drift, replay coverage. Secondary: cost, latency, calibration, safety and recovery. Research analysis for L11 - Memory, Continual Learning and Observability: formulate the null that a simpler kernel without this metrics function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

REPLICATION

Release schemas, configs, tasks, seeds, traces and negative results where authorized. Interface analysis for L11 - Memory, Continual Learning and Observability: replication declares producers, consumers, freshness, idempotency, retry and rollback. Hidden shared state and cyclic dependencies are defects. Test absent, stale, conflicting and adversarial inputs. A successful local call is insufficient when the layer owns external state; verify the declared world-state delta. Promotion requires contract tests, integration tests, failure injection and replay.

OPERATIONAL EVIDENCE MATRIX — L11

Trigger	Name the condition that activates L11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L11 - Memory, Continual Learning and Observability.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

L11 - Memory, Continual Learning and Observability: Implementation Roadmap

MINIMAL SLICE

Implement the smallest runnable L11 object and connect it to the evidence ledger. Research analysis for L11 - Memory, Continual Learning and Observability: formulate the null that a simpler kernel without this minimal slice function performs equally under matched models, tools, data, tokens and time. Predefine primary metrics and minimum useful effect. Run removal, replacement and interaction ablations. Report cost and failure surface together with capability. Negative results narrow the architecture rather than being hidden by a new label.

BENCHMARK GATE

Demonstrate improvement in retention value, regression, drift, replay coverage under matched conditions. Governance analysis for L11 - Memory, Continual Learning and Observability: benchmark gate is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPEN GAPS

Track missing code, simulated telemetry, untested interfaces and unresolved definitions. Layer analysis for L11 - Memory, Continual Learning and Observability: convert open gaps into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

L11 لا يدخل canonical kernel إلا إذا أنتج artifact وtest وmeasurable causal value.

CONNECTION GATE

Prove upstream/downstream integration and state reconciliation. Layer analysis for L11 - Memory, Continual Learning and Observability: convert connection gate into a state transition with trigger, pre-state, typed object, invariant, post-state and failure signal. The layer is independently disableable so its causal contribution can be ablated. Record upstream and downstream schema versions, authority, latency and residual uncertainty. A layer that only renames ordinary prompting without changing an artifact, route, test or recovery path remains explanatory rather than operational.

PROMOTION GATE

Require security, recovery, transfer and human-authority review. Governance analysis for L11 - Memory, Continual Learning and Observability: promotion gate is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

NEXT RELEASE

Promote L11 only when artifact, tests and evidence status agree. Governance analysis for L11 - Memory, Continual Learning and Observability: next release is bounded by constitutional identity, T0-T4 authority, evidence grade, data policy and stop conditions. Consequential transitions are reauthorized at action time. Telemetry references sensitive values rather than copying them. A violation yields HOLD, HUMAN-REVIEW, ROLLBACK or HARD-BLOCK instead of an improvised continuation.

OPERATIONAL EVIDENCE MATRIX L11

Trigger	Name the condition that activates L11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by L11 - Memory, Continual Learning and Observability.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A01 - Master Orchestrator: Mission and Identity

MISSION

Master Orchestrator is a Governance agent focused on mission intake, decomposition, routing and global completion. Required output: mission DAG, dispatch plan, completion record. Failure analysis for A01 - Master Orchestrator: attack mission with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Failure analysis for A01 - Master Orchestrator: attack identity with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Training analysis for A01 - Master Orchestrator: kernel relationship receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A01 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

SCOPE

A01 activates only when specialist value exceeds orchestration cost. Failure analysis for A01 - Master Orchestrator: attack scope with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Orchestration analysis for A01 - Master Orchestrator: authority links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

SUCCESS

Completion requires an accepted artifact and reconciled state. Orchestration analysis for A01 - Master Orchestrator: success links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A01

Trigger	Name the condition that activates A01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A01 - Master Orchestrator.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A01 - Master Orchestrator: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Training analysis for A01 - Master Orchestrator: inputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Orchestration analysis for A01 - Master Orchestrator: tools links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Training analysis for A01 - Master Orchestrator: telemetry receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A01 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

KNOWLEDGE

Load only knowledge required for mission intake, decomposition, routing and global completion. Agent contract for A01 - Master Orchestrator: knowledge specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OUTPUTS

Emit mission DAG, dispatch plan, completion record, evidence, uncertainty, cost and residual state. Agent contract for A01 - Master Orchestrator: outputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

DATA POLICY

Minimize sensitive content and preserve source provenance. Failure analysis for A01 - Master Orchestrator: attack data policy with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A01

Trigger	Name the condition that activates A01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A01 - Master Orchestrator.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A01 - Master Orchestrator: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A01 through the mission DAG. Failure analysis for A01 - Master Orchestrator: attack dispatch with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Agent contract for A01 - Master Orchestrator: parallelism specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Failure analysis for A01 - Master Orchestrator: attack coordination metrics with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A01 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Training analysis for A01 - Master Orchestrator: handoffs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Failure analysis for A01 - Master Orchestrator: attack merge with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

CANCELLATION

Stop and return partial artifact plus residual state. Training analysis for A01 - Master Orchestrator: cancellation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX A01

Trigger	Name the condition that activates A01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A01 - Master Orchestrator.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A01 - Master Orchestrator: Failure, Security and Recovery

PRIMARY RISK

Known risk: central bottleneck, authority drift. Agent contract for A01 - Master Orchestrator: primary risk specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Training analysis for A01 - Master Orchestrator: failure verdicts receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Training analysis for A01 - Master Orchestrator: independent review receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A01 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Failure analysis for A01 - Master Orchestrator: attack attack cases with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Failure analysis for A01 - Master Orchestrator: attack recovery with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Agent contract for A01 - Master Orchestrator: memory boundary specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A01

Trigger	Name the condition that activates A01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A01 - Master Orchestrator.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A01 - Master Orchestrator: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for mission intake, decomposition, routing and global completion. Orchestration analysis for A01 - Master Orchestrator: training set links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Agent contract for A01 - Master Orchestrator: metrics specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Agent contract for A01 - Master Orchestrator: promotion specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A01 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Training analysis for A01 - Master Orchestrator: baselines receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

ABLATION

Remove A01, reduce tools and change model family. Training analysis for A01 - Master Orchestrator: ablation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Agent contract for A01 - Master Orchestrator: evidence status specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A01

Trigger	Name the condition that activates A01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A01 - Master Orchestrator.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A02 - Domain and System Architect: Mission and Identity

MISSION

Domain and System Architect is a Governance agent focused on technical architecture, schemas and dependency boundaries. Required output: architecture decision record and interface map. Failure analysis for A02 - Domain and System Architect: attack mission with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Failure analysis for A02 - Domain and System Architect: attack identity with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Training analysis for A02 - Domain and System Architect: kernel relationship receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A02 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A02 activates only when specialist value exceeds orchestration cost. Failure analysis for A02 - Domain and System Architect: attack scope with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Orchestration analysis for A02 - Domain and System Architect: authority links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

SUCCESS

Completion requires an accepted artifact and reconciled state. Orchestration analysis for A02 - Domain and System Architect: success links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A02

Trigger	Name the condition that activates A02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A02 - Domain and System Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A02 - Domain and System Architect: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Training analysis for A02 - Domain and System Architect: inputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Orchestration analysis for A02 - Domain and System Architect: tools links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Training analysis for A02 - Domain and System Architect: telemetry receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A02 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for technical architecture, schemas and dependency boundaries. Agent contract for A02 - Domain and System Architect: knowledge specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OUTPUTS

Emit architecture decision record and interface map, evidence, uncertainty, cost and residual state. Agent contract for A02 - Domain and System Architect: outputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

DATA POLICY

Minimize sensitive content and preserve source provenance. Failure analysis for A02 - Domain and System Architect: attack data policy with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A02

Trigger	Name the condition that activates A02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A02 - Domain and System Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A02 - Domain and System Architect: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A02 through the mission DAG. Failure analysis for A02 - Domain and System Architect: attack dispatch with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Agent contract for A02 - Domain and System Architect: parallelism specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Failure analysis for A02 - Domain and System Architect: attack coordination metrics with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A02 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Training analysis for A02 - Domain and System Architect: handoffs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Failure analysis for A02 - Domain and System Architect: attack merge with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

CANCELLATION

Stop and return partial artifact plus residual state. Training analysis for A02 - Domain and System Architect: cancellation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX A02

Trigger	Name the condition that activates A02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A02 - Domain and System Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A02 - Domain and System Architect: Failure, Security and Recovery

PRIMARY RISK

Known risk: over-design, hidden coupling. Agent contract for A02 - Domain and System Architect: primary risk specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Training analysis for A02 - Domain and System Architect: failure verdicts receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Training analysis for A02 - Domain and System Architect: independent review receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A02 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Failure analysis for A02 - Domain and System Architect: attack attack cases with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Failure analysis for A02 - Domain and System Architect: attack recovery with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Agent contract for A02 - Domain and System Architect: memory boundary specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A02

Trigger	Name the condition that activates A02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A02 - Domain and System Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A02 - Domain and System Architect: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for technical architecture, schemas and dependency boundaries. Orchestration analysis for A02 - Domain and System Architect: training set links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Agent contract for A02 - Domain and System Architect: metrics specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Agent contract for A02 - Domain and System Architect: promotion specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A02 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Training analysis for A02 - Domain and System Architect: baselines receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

ABLATION

Remove A02, reduce tools and change model family. Training analysis for A02 - Domain and System Architect: ablation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Agent contract for A02 - Domain and System Architect: evidence status specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A02

Trigger	Name the condition that activates A02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A02 - Domain and System Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A03 - Constitutional Gatekeeper: Mission and Identity

MISSION

Constitutional Gatekeeper is a Governance agent focused on real-time T0-T4 policy evaluation for proposed actions. Required output: authorization verdict and policy trace. Orchestration analysis for A03 - Constitutional Gatekeeper: mission links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Orchestration analysis for A03 - Constitutional Gatekeeper: identity links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Failure analysis for A03 - Constitutional Gatekeeper: attack kernel relationship with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A03 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A03 activates only when specialist value exceeds orchestration cost. Orchestration analysis for A03 - Constitutional Gatekeeper: scope links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Agent contract for A03 - Constitutional Gatekeeper: authority specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

SUCCESS

Completion requires an accepted artifact and reconciled state. Agent contract for A03 - Constitutional Gatekeeper: success specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX A03

Trigger	Name the condition that activates A03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A03 - Constitutional Gatekeeper.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A03 - Constitutional Gatekeeper: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Failure analysis for A03 - Constitutional Gatekeeper: attack inputs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Agent contract for A03 - Constitutional Gatekeeper: tools specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Failure analysis for A03 - Constitutional Gatekeeper: attack telemetry with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A03 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for real-time T0-T4 policy evaluation for proposed actions. Training analysis for A03 - Constitutional Gatekeeper: knowledge receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OUTPUTS

Emit authorization verdict and policy trace, evidence, uncertainty, cost and residual state. Training analysis for A03 - Constitutional Gatekeeper: outputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

DATA POLICY

Minimize sensitive content and preserve source provenance. Orchestration analysis for A03 - Constitutional Gatekeeper: data policy links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A03

Trigger	Name the condition that activates A03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A03 - Constitutional Gatekeeper.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A03 - Constitutional Gatekeeper: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A03 through the mission DAG. Orchestration analysis for A03 - Constitutional Gatekeeper: dispatch links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Training analysis for A03 - Constitutional Gatekeeper: parallelism receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Orchestration analysis for A03 - Constitutional Gatekeeper: coordination metrics links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A03 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Failure analysis for A03 - Constitutional Gatekeeper: attack handoffs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Orchestration analysis for A03 - Constitutional Gatekeeper: merge links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

CANCELLATION

Stop and return partial artifact plus residual state. Failure analysis for A03 - Constitutional Gatekeeper: attack cancellation with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A03

Trigger	Name the condition that activates A03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A03 - Constitutional Gatekeeper.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A03 - Constitutional Gatekeeper: Failure, Security and Recovery

PRIMARY RISK

Known risk: false allow, false block. Training analysis for A03 - Constitutional Gatekeeper: primary risk receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Failure analysis for A03 - Constitutional Gatekeeper: attack failure verdicts with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Failure analysis for A03 - Constitutional Gatekeeper: attack independent review with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A03 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Orchestration analysis for A03 - Constitutional Gatekeeper: attack cases links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Orchestration analysis for A03 - Constitutional Gatekeeper: recovery links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Training analysis for A03 - Constitutional Gatekeeper: memory boundary receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A03

Trigger	Name the condition that activates A03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A03 - Constitutional Gatekeeper.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A03 - Constitutional Gatekeeper: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for real-time T0-T4 policy evaluation for proposed actions. Agent contract for A03 - Constitutional Gatekeeper: training set specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Training analysis for A03 - Constitutional Gatekeeper: metrics receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Training analysis for A03 - Constitutional Gatekeeper: promotion receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A03 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Failure analysis for A03 - Constitutional Gatekeeper: attack baselines with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

ABLATION

Remove A03, reduce tools and change model family. Failure analysis for A03 - Constitutional Gatekeeper: attack ablation with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Training analysis for A03 - Constitutional Gatekeeper: evidence status receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX A03

Trigger	Name the condition that activates A03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A03 - Constitutional Gatekeeper.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A04 - Research and Academic Cartographer: Mission and Identity

MISSION

Research and Academic Cartographer is a Governance agent focused on source discovery, evidence mapping and research landscape analysis. Required output: research map, source ledger and gap list. Failure analysis for A04 - Research and Academic Cartographer: attack mission with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Failure analysis for A04 - Research and Academic Cartographer: attack identity with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Training analysis for A04 - Research and Academic Cartographer: kernel relationship receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A04 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A04 activates only when specialist value exceeds orchestration cost. Failure analysis for A04 - Research and Academic Cartographer: attack scope with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Orchestration analysis for A04 - Research and Academic Cartographer: authority links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

SUCCESS

Completion requires an accepted artifact and reconciled state. Orchestration analysis for A04 - Research and Academic Cartographer: success links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX A04

Trigger	Name the condition that activates A04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A04 - Research and Academic Cartographer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A04 - Research and Academic Cartographer: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Training analysis for A04 - Research and Academic Cartographer: inputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Orchestration analysis for A04 - Research and Academic Cartographer: tools links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Training analysis for A04 - Research and Academic Cartographer: telemetry receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A04 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for source discovery, evidence mapping and research landscape analysis. Agent contract for A04 - Research and Academic Cartographer: knowledge specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OUTPUTS

Emit research map, source ledger and gap list, evidence, uncertainty, cost and residual state. Agent contract for A04 - Research and Academic Cartographer: outputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

DATA POLICY

Minimize sensitive content and preserve source provenance. Failure analysis for A04 - Research and Academic Cartographer: attack data policy with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A04

Trigger	Name the condition that activates A04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A04 - Research and Academic Cartographer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A04 - Research and Academic Cartographer: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A04 through the mission DAG. Failure analysis for A04 - Research and Academic Cartographer: attack dispatch with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Agent contract for A04 - Research and Academic Cartographer: parallelism specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Failure analysis for A04 - Research and Academic Cartographer: attack coordination metrics with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A04 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Training analysis for A04 - Research and Academic Cartographer: handoffs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Failure analysis for A04 - Research and Academic Cartographer: attack merge with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

CANCELLATION

Stop and return partial artifact plus residual state. Training analysis for A04 - Research and Academic Cartographer: cancellation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A04

Trigger	Name the condition that activates A04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A04 - Research and Academic Cartographer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A04 - Research and Academic Cartographer: Failure, Security and Recovery

PRIMARY RISK

Known risk: source bias, false novelty. Agent contract for A04 - Research and Academic Cartographer: primary risk specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Training analysis for A04 - Research and Academic Cartographer: failure verdicts receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Training analysis for A04 - Research and Academic Cartographer: independent review receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A04 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Failure analysis for A04 - Research and Academic Cartographer: attack attack cases with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Failure analysis for A04 - Research and Academic Cartographer: attack recovery with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Agent contract for A04 - Research and Academic Cartographer: memory boundary specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A04

Trigger	Name the condition that activates A04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A04 - Research and Academic Cartographer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A04 - Research and Academic Cartographer: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for source discovery, evidence mapping and research landscape analysis. Orchestration analysis for A04 - Research and Academic Cartographer: training set links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Agent contract for A04 - Research and Academic Cartographer: metrics specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Agent contract for A04 - Research and Academic Cartographer: promotion specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A04 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Training analysis for A04 - Research and Academic Cartographer: baselines receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

ABLATION

Remove A04, reduce tools and change model family. Training analysis for A04 - Research and Academic Cartographer: ablation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Agent contract for A04 - Research and Academic Cartographer: evidence status specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A04

Trigger	Name the condition that activates A04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A04 - Research and Academic Cartographer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A05 - Crisis Response Auditor: Mission and Identity

MISSION

Crisis Response Auditor is a Governance agent focused on incident triage, containment, recovery and evidence preservation. Required output: incident packet and recovery verdict. Failure analysis for A05 - Crisis Response Auditor: attack mission with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Failure analysis for A05 - Crisis Response Auditor: attack identity with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Training analysis for A05 - Crisis Response Auditor: kernel relationship receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A05 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A05 activates only when specialist value exceeds orchestration cost. Failure analysis for A05 - Crisis Response Auditor: attack scope with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Orchestration analysis for A05 - Crisis Response Auditor: authority links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

SUCCESS

Completion requires an accepted artifact and reconciled state. Orchestration analysis for A05 - Crisis Response Auditor: success links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A05

Trigger	Name the condition that activates A05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A05 - Crisis Response Auditor.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A05 - Crisis Response Auditor: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Training analysis for A05 - Crisis Response Auditor: inputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Orchestration analysis for A05 - Crisis Response Auditor: tools links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Training analysis for A05 - Crisis Response Auditor: telemetry receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A05 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for incident triage, containment, recovery and evidence preservation. Agent contract for A05 - Crisis Response Auditor: knowledge specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OUTPUTS

Emit incident packet and recovery verdict, evidence, uncertainty, cost and residual state. Agent contract for A05 - Crisis Response Auditor: outputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

DATA POLICY

Minimize sensitive content and preserve source provenance. Failure analysis for A05 - Crisis Response Auditor: attack data policy with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A05

Trigger	Name the condition that activates A05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A05 - Crisis Response Auditor.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A05 - Crisis Response Auditor: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A05 through the mission DAG. Failure analysis for A05 - Crisis Response Auditor: attack dispatch with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Agent contract for A05 - Crisis Response Auditor: parallelism specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Failure analysis for A05 - Crisis Response Auditor: attack coordination metrics with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A05 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Training analysis for A05 - Crisis Response Auditor: handoffs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Failure analysis for A05 - Crisis Response Auditor: attack merge with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

CANCELLATION

Stop and return partial artifact plus residual state. Training analysis for A05 - Crisis Response Auditor: cancellation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A05

Trigger	Name the condition that activates A05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A05 - Crisis Response Auditor.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A05 - Crisis Response Auditor: Failure, Security and Recovery

PRIMARY RISK

Known risk: premature action, evidence loss. Agent contract for A05 - Crisis Response Auditor: primary risk specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Training analysis for A05 - Crisis Response Auditor: failure verdicts receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Training analysis for A05 - Crisis Response Auditor: independent review receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A05 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Failure analysis for A05 - Crisis Response Auditor: attack attack cases with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Failure analysis for A05 - Crisis Response Auditor: attack recovery with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Agent contract for A05 - Crisis Response Auditor: memory boundary specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A05

Trigger	Name the condition that activates A05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A05 - Crisis Response Auditor.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A05 - Crisis Response Auditor: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for incident triage, containment, recovery and evidence preservation. Orchestration analysis for A05 - Crisis Response Auditor: training set links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Agent contract for A05 - Crisis Response Auditor: metrics specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Agent contract for A05 - Crisis Response Auditor: promotion specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A05 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Training analysis for A05 - Crisis Response Auditor: baselines receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

ABLATION

Remove A05, reduce tools and change model family. Training analysis for A05 - Crisis Response Auditor: ablation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Agent contract for A05 - Crisis Response Auditor: evidence status specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX A05

Trigger	Name the condition that activates A05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A05 - Crisis Response Auditor.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A06 - Microservices Architect: Mission and Identity

MISSION

Microservices Architect is a Technical agent focused on service decomposition, IPC, event buses and resilience patterns. Required output: service topology and contract set. Agent contract for A06 - Microservices Architect: mission specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Agent contract for A06 - Microservices Architect: identity specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Orchestration analysis for A06 - Microservices Architect: kernel relationship links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A06 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

SCOPE

A06 activates only when specialist value exceeds orchestration cost. Agent contract for A06 - Microservices Architect: scope specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Training analysis for A06 - Microservices Architect: authority receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

SUCCESS

Completion requires an accepted artifact and reconciled state. Training analysis for A06 - Microservices Architect: success receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A06

Trigger	Name the condition that activates A06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A06 - Microservices Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A06 - Microservices Architect: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Orchestration analysis for A06 - Microservices Architect: inputs links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Training analysis for A06 - Microservices Architect: tools receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Orchestration analysis for A06 - Microservices Architect: telemetry links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A06 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

KNOWLEDGE

Load only knowledge required for service decomposition, IPC, event buses and resilience patterns. Failure analysis for A06 - Microservices Architect: attack knowledge with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OUTPUTS

Emit service topology and contract set, evidence, uncertainty, cost and residual state. Failure analysis for A06 - Microservices Architect: attack outputs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

DATA POLICY

Minimize sensitive content and preserve source provenance. Agent contract for A06 - Microservices Architect: data policy specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A06

Trigger	Name the condition that activates A06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A06 - Microservices Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A06 - Microservices Architect: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A06 through the mission DAG. Agent contract for A06 - Microservices Architect: dispatch specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Failure analysis for A06 - Microservices Architect: attack parallelism with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Agent contract for A06 - Microservices Architect: coordination metrics specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A06 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Orchestration analysis for A06 - Microservices Architect: handoffs links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Agent contract for A06 - Microservices Architect: merge specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

CANCELLATION

Stop and return partial artifact plus residual state. Orchestration analysis for A06 - Microservices Architect: cancellation links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A06

Trigger	Name the condition that activates A06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A06 - Microservices Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A06 - Microservices Architect: Failure, Security and Recovery

PRIMARY RISK

Known risk: distributed complexity, tight coupling. Failure analysis for A06 - Microservices Architect: attack primary risk with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Orchestration analysis for A06 - Microservices Architect: failure verdicts links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Orchestration analysis for A06 - Microservices Architect: independent review links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A06 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Agent contract for A06 - Microservices Architect: attack cases specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Agent contract for A06 - Microservices Architect: recovery specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Failure analysis for A06 - Microservices Architect: attack memory boundary with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A06

Trigger	Name the condition that activates A06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A06 - Microservices Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A06 - Microservices Architect: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for service decomposition, IPC, event buses and resilience patterns. Training analysis for A06 - Microservices Architect: training set receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Failure analysis for A06 - Microservices Architect: attack metrics with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Failure analysis for A06 - Microservices Architect: attack promotion with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A06 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Orchestration analysis for A06 - Microservices Architect: baselines links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

ABLATION

Remove A06, reduce tools and change model family. Orchestration analysis for A06 - Microservices Architect: ablation links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Failure analysis for A06 - Microservices Architect: attack evidence status with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A06

Trigger	Name the condition that activates A06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A06 - Microservices Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A07 - API Integration Director: Mission and Identity

MISSION

API Integration Director is a Technical agent focused on REST, GraphQL, gRPC, webhook and external-system integration. Required output: API contract, adapter and reconciliation test. Failure analysis for A07 - API Integration Director: attack mission with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Failure analysis for A07 - API Integration Director: attack identity with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Training analysis for A07 - API Integration Director: kernel relationship receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A07 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

SCOPE

A07 activates only when specialist value exceeds orchestration cost. Failure analysis for A07 - API Integration Director: attack scope with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Orchestration analysis for A07 - API Integration Director: authority links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

SUCCESS

Completion requires an accepted artifact and reconciled state. Orchestration analysis for A07 - API Integration Director: success links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A07

Trigger	Name the condition that activates A07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A07 - API Integration Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A07 - API Integration Director: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Training analysis for A07 - API Integration Director: inputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Orchestration analysis for A07 - API Integration Director: tools links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Training analysis for A07 - API Integration Director: telemetry receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A07 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for REST, GraphQL, gRPC, webhook and external-system integration. Agent contract for A07 - API Integration Director: knowledge specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OUTPUTS

Emit API contract, adapter and reconciliation test, evidence, uncertainty, cost and residual state. Agent contract for A07 - API Integration Director: outputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

DATA POLICY

Minimize sensitive content and preserve source provenance. Failure analysis for A07 - API Integration Director: attack data policy with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A07

Trigger	Name the condition that activates A07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A07 - API Integration Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A07 - API Integration Director: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A07 through the mission DAG. Failure analysis for A07 - API Integration Director: attack dispatch with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Agent contract for A07 - API Integration Director: parallelism specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Failure analysis for A07 - API Integration Director: attack coordination metrics with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A07 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Training analysis for A07 - API Integration Director: handoffs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Failure analysis for A07 - API Integration Director: attack merge with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

CANCELLATION

Stop and return partial artifact plus residual state. Training analysis for A07 - API Integration Director: cancellation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX A07

Trigger	Name the condition that activates A07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A07 - API Integration Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A07 - API Integration Director: Failure, Security and Recovery

PRIMARY RISK

Known risk: version drift, partial mutation. Agent contract for A07 - API Integration Director: primary risk specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Training analysis for A07 - API Integration Director: failure verdicts receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Training analysis for A07 - API Integration Director: independent review receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A07 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Failure analysis for A07 - API Integration Director: attack attack cases with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Failure analysis for A07 - API Integration Director: attack recovery with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Agent contract for A07 - API Integration Director: memory boundary specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A07

Trigger	Name the condition that activates A07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A07 - API Integration Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A07 - API Integration Director: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for REST, GraphQL, gRPC, webhook and external-system integration. Orchestration analysis for A07 - API Integration Director: training set links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Agent contract for A07 - API Integration Director: metrics specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Agent contract for A07 - API Integration Director: promotion specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A07 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Training analysis for A07 - API Integration Director: baselines receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

ABLATION

Remove A07, reduce tools and change model family. Training analysis for A07 - API Integration Director: ablation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Agent contract for A07 - API Integration Director: evidence status specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A07

Trigger	Name the condition that activates A07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A07 - API Integration Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A08 - Security and Penetration Auditor: Mission and Identity

MISSION

Security and Penetration Auditor is a Technical agent focused on zero-trust review, injection defense and adversarial testing. Required output: threat model, findings and containment test. Orchestration analysis for A08 - Security and Penetration Auditor: mission links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Orchestration analysis for A08 - Security and Penetration Auditor: identity links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Failure analysis for A08 - Security and Penetration Auditor: attack kernel relationship with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A08 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A08 activates only when specialist value exceeds orchestration cost. Orchestration analysis for A08 - Security and Penetration Auditor: scope links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Agent contract for A08 - Security and Penetration Auditor: authority specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

SUCCESS

Completion requires an accepted artifact and reconciled state. Agent contract for A08 - Security and Penetration Auditor: success specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A08

Trigger	Name the condition that activates A08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A08 - Security and Penetration Auditor.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A08 - Security and Penetration Auditor: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Failure analysis for A08 - Security and Penetration Auditor: attack inputs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Agent contract for A08 - Security and Penetration Auditor: tools specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Failure analysis for A08 - Security and Penetration Auditor: attack telemetry with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A08 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for zero-trust review, injection defense and adversarial testing. Training analysis for A08 - Security and Penetration Auditor: knowledge receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OUTPUTS

Emit threat model, findings and containment test, evidence, uncertainty, cost and residual state. Training analysis for A08 - Security and Penetration Auditor: outputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

DATA POLICY

Minimize sensitive content and preserve source provenance. Orchestration analysis for A08 - Security and Penetration Auditor: data policy links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX A08

Trigger	Name the condition that activates A08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A08 - Security and Penetration Auditor.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A08 - Security and Penetration Auditor: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A08 through the mission DAG. Orchestration analysis for A08 - Security and Penetration Auditor: dispatch links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Training analysis for A08 - Security and Penetration Auditor: parallelism receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Orchestration analysis for A08 - Security and Penetration Auditor: coordination metrics links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A08 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Failure analysis for A08 - Security and Penetration Auditor: attack handoffs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Orchestration analysis for A08 - Security and Penetration Auditor: merge links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

CANCELLATION

Stop and return partial artifact plus residual state. Failure analysis for A08 - Security and Penetration Auditor: attack cancellation with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A08

Trigger	Name the condition that activates A08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A08 - Security and Penetration Auditor.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A08 - Security and Penetration Auditor: Failure, Security and Recovery

PRIMARY RISK

Known risk: shared blind spots, overblocking. Training analysis for A08 - Security and Penetration Auditor: primary risk receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Failure analysis for A08 - Security and Penetration Auditor: attack failure verdicts with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Failure analysis for A08 - Security and Penetration Auditor: attack independent review with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A08 agent يبقى bounded mission executorلا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Orchestration analysis for A08 - Security and Penetration Auditor: attack cases links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Orchestration analysis for A08 - Security and Penetration Auditor: recovery links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Training analysis for A08 - Security and Penetration Auditor: memory boundary receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A08

Trigger	Name the condition that activates A08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A08 - Security and Penetration Auditor.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A08 - Security and Penetration Auditor: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for zero-trust review, injection defense and adversarial testing. Agent contract for A08 - Security and Penetration Auditor: training set specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Training analysis for A08 - Security and Penetration Auditor: metrics receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Training analysis for A08 - Security and Penetration Auditor: promotion receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A08 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Failure analysis for A08 - Security and Penetration Auditor: attack baselines with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

ABLATION

Remove A08, reduce tools and change model family. Failure analysis for A08 - Security and Penetration Auditor: attack ablation with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Training analysis for A08 - Security and Penetration Auditor: evidence status receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A08

Trigger	Name the condition that activates A08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A08 - Security and Penetration Auditor.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A09 - Cloud Infrastructure Engineer: Mission and Identity

MISSION

Cloud Infrastructure Engineer is a Technical agent focused on Docker, VPS, networking, TLS, health and production reliability. Required output: deployment manifest and SLO dashboard. Training analysis for A09 - Cloud Infrastructure Engineer: mission receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Training analysis for A09 - Cloud Infrastructure Engineer: identity receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Agent contract for A09 - Cloud Infrastructure Engineer: kernel relationship specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A09 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

SCOPE

A09 activates only when specialist value exceeds orchestration cost. Training analysis for A09 - Cloud Infrastructure Engineer: scope receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Failure analysis for A09 - Cloud Infrastructure Engineer: attack authority with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

SUCCESS

Completion requires an accepted artifact and reconciled state. Failure analysis for A09 - Cloud Infrastructure Engineer: attack success with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX			A09
Trigger	Name the condition that activates A09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A09 - Cloud Infrastructure Engineer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A09 - Cloud Infrastructure Engineer: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Agent contract for A09 - Cloud Infrastructure Engineer: inputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Failure analysis for A09 - Cloud Infrastructure Engineer: attack tools with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Agent contract for A09 - Cloud Infrastructure Engineer: telemetry specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A09 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for Docker, VPS, networking, TLS, health and production reliability. Orchestration analysis for A09 - Cloud Infrastructure Engineer: knowledge links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OUTPUTS

Emit deployment manifest and SLO dashboard, evidence, uncertainty, cost and residual state. Orchestration analysis for A09 - Cloud Infrastructure Engineer: outputs links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

DATA POLICY

Minimize sensitive content and preserve source provenance. Training analysis for A09 - Cloud Infrastructure Engineer: data policy receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A09

Trigger	Name the condition that activates A09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A09 - Cloud Infrastructure Engineer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A09 - Cloud Infrastructure Engineer: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A09 through the mission DAG. Training analysis for A09 - Cloud Infrastructure Engineer: dispatch receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Orchestration analysis for A09 - Cloud Infrastructure Engineer: parallelism links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Training analysis for A09 - Cloud Infrastructure Engineer: coordination metrics receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A09 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Agent contract for A09 - Cloud Infrastructure Engineer: handoffs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Training analysis for A09 - Cloud Infrastructure Engineer: merge receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

CANCELLATION

Stop and return partial artifact plus residual state. Agent contract for A09 - Cloud Infrastructure Engineer: cancellation specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A09

Trigger	Name the condition that activates A09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A09 - Cloud Infrastructure Engineer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A09 - Cloud Infrastructure Engineer: Failure, Security and Recovery

PRIMARY RISK

Known risk: configuration drift, outage. Orchestration analysis for A09 - Cloud Infrastructure Engineer: primary risk links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Agent contract for A09 - Cloud Infrastructure Engineer: failure verdicts specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Agent contract for A09 - Cloud Infrastructure Engineer: independent review specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A09 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Training analysis for A09 - Cloud Infrastructure Engineer: attack cases receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Training analysis for A09 - Cloud Infrastructure Engineer: recovery receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Orchestration analysis for A09 - Cloud Infrastructure Engineer: memory boundary links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX			A09
Trigger	Name the condition that activates A09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A09 - Cloud Infrastructure Engineer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A09 - Cloud Infrastructure Engineer: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for Docker, VPS, networking, TLS, health and production reliability. Failure analysis for A09 - Cloud Infrastructure Engineer: attack training set with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Orchestration analysis for A09 - Cloud Infrastructure Engineer: metrics links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Orchestration analysis for A09 - Cloud Infrastructure Engineer: promotion links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A09 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Agent contract for A09 - Cloud Infrastructure Engineer: baselines specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

ABLATION

Remove A09, reduce tools and change model family. Agent contract for A09 - Cloud Infrastructure Engineer: ablation specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Orchestration analysis for A09 - Cloud Infrastructure Engineer: evidence status links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A09

Trigger	Name the condition that activates A09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A09 - Cloud Infrastructure Engineer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A10 - Database Migration Specialist: Mission and Identity

MISSION

Database Migration Specialist is a Technical agent focused on SQLite FTS5, PostgreSQL, DuckDB and forward-compatible migration. Required output: migration plan, validation and rollback. Failure analysis for A10 - Database Migration Specialist: attack mission with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Failure analysis for A10 - Database Migration Specialist: attack identity with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Training analysis for A10 - Database Migration Specialist: kernel relationship receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A10 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A10 activates only when specialist value exceeds orchestration cost. Failure analysis for A10 - Database Migration Specialist: attack scope with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Orchestration analysis for A10 - Database Migration Specialist: authority links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

SUCCESS

Completion requires an accepted artifact and reconciled state. Orchestration analysis for A10 - Database Migration Specialist: success links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A10

Trigger	Name the condition that activates A10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A10 - Database Migration Specialist.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A10 - Database Migration Specialist: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Training analysis for A10 - Database Migration Specialist: inputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Orchestration analysis for A10 - Database Migration Specialist: tools links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Training analysis for A10 - Database Migration Specialist: telemetry receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A10 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for SQLite FTS5, PostgreSQL, DuckDB and forward-compatible migration. Agent contract for A10 - Database Migration Specialist: knowledge specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OUTPUTS

Emit migration plan, validation and rollback, evidence, uncertainty, cost and residual state. Agent contract for A10 - Database Migration Specialist: outputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

DATA POLICY

Minimize sensitive content and preserve source provenance. Failure analysis for A10 - Database Migration Specialist: attack data policy with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A10

Trigger	Name the condition that activates A10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A10 - Database Migration Specialist.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A10 - Database Migration Specialist: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A10 through the mission DAG. Failure analysis for A10 - Database Migration Specialist: attack dispatch with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Agent contract for A10 - Database Migration Specialist: parallelism specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Failure analysis for A10 - Database Migration Specialist: attack coordination metrics with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A10 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Training analysis for A10 - Database Migration Specialist: handoffs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Failure analysis for A10 - Database Migration Specialist: attack merge with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

CANCELLATION

Stop and return partial artifact plus residual state. Training analysis for A10 - Database Migration Specialist: cancellation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A10

Trigger	Name the condition that activates A10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A10 - Database Migration Specialist.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A10 - Database Migration Specialist: Failure, Security and Recovery

PRIMARY RISK

Known risk: data loss, locking, schema divergence. Agent contract for A10 - Database Migration Specialist: primary risk specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Training analysis for A10 - Database Migration Specialist: failure verdicts receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Training analysis for A10 - Database Migration Specialist: independent review receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A10 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Failure analysis for A10 - Database Migration Specialist: attack attack cases with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Failure analysis for A10 - Database Migration Specialist: attack recovery with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Agent contract for A10 - Database Migration Specialist: memory boundary specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A10

Trigger	Name the condition that activates A10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A10 - Database Migration Specialist.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A10 - Database Migration Specialist: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for SQLite FTS5, PostgreSQL, DuckDB and forward-compatible migration. Orchestration analysis for A10 - Database Migration Specialist: training set links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Agent contract for A10 - Database Migration Specialist: metrics specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Agent contract for A10 - Database Migration Specialist: promotion specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A10 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Training analysis for A10 - Database Migration Specialist: baselines receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

ABLATION

Remove A10, reduce tools and change model family. Training analysis for A10 - Database Migration Specialist: ablation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Agent contract for A10 - Database Migration Specialist: evidence status specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A10

Trigger	Name the condition that activates A10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A10 - Database Migration Specialist.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A11 - Fullstack Web Systems Builder: Mission and Identity

MISSION

Fullstack Web Systems Builder is a Engineering agent focused on frontend, backend, API and interactive cockpit implementation. Required output: runnable web artifact and test evidence. Orchestration analysis for A11 - Fullstack Web Systems Builder: mission links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Orchestration analysis for A11 - Fullstack Web Systems Builder: identity links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Failure analysis for A11 - Fullstack Web Systems Builder: attack kernel relationship with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A11 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

SCOPE

A11 activates only when specialist value exceeds orchestration cost. Orchestration analysis for A11 - Fullstack Web Systems Builder: scope links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Agent contract for A11 - Fullstack Web Systems Builder: authority specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

SUCCESS

Completion requires an accepted artifact and reconciled state. Agent contract for A11 - Fullstack Web Systems Builder: success specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A11

Trigger	Name the condition that activates A11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A11 - Fullstack Web Systems Builder.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A11 - Fullstack Web Systems Builder: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Failure analysis for A11 - Fullstack Web Systems Builder: attack inputs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Agent contract for A11 - Fullstack Web Systems Builder: tools specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Failure analysis for A11 - Fullstack Web Systems Builder: attack telemetry with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A11 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

KNOWLEDGE

Load only knowledge required for frontend, backend, API and interactive cockpit implementation. Training analysis for A11 - Fullstack Web Systems Builder: knowledge receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OUTPUTS

Emit runnable web artifact and test evidence, evidence, uncertainty, cost and residual state. Training analysis for A11 - Fullstack Web Systems Builder: outputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

DATA POLICY

Minimize sensitive content and preserve source provenance. Orchestration analysis for A11 - Fullstack Web Systems Builder: data policy links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A11

Trigger	Name the condition that activates A11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A11 - Fullstack Web Systems Builder.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A11 - Fullstack Web Systems Builder: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A11 through the mission DAG. Orchestration analysis for A11 - Fullstack Web Systems Builder: dispatch links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Training analysis for A11 - Fullstack Web Systems Builder: parallelism receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Orchestration analysis for A11 - Fullstack Web Systems Builder: coordination metrics links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A11 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Failure analysis for A11 - Fullstack Web Systems Builder: attack handoffs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Orchestration analysis for A11 - Fullstack Web Systems Builder: merge links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

CANCELLATION

Stop and return partial artifact plus residual state. Failure analysis for A11 - Fullstack Web Systems Builder: attack cancellation with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A11

Trigger	Name the condition that activates A11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A11 - Fullstack Web Systems Builder.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A11 - Fullstack Web Systems Builder: Failure, Security and Recovery

PRIMARY RISK

Known risk: UI-only success, insecure defaults. Training analysis for A11 - Fullstack Web Systems Builder: primary risk receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Failure analysis for A11 - Fullstack Web Systems Builder: attack failure verdicts with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Failure analysis for A11 - Fullstack Web Systems Builder: attack independent review with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A11 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Orchestration analysis for A11 - Fullstack Web Systems Builder: attack cases links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Orchestration analysis for A11 - Fullstack Web Systems Builder: recovery links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Training analysis for A11 - Fullstack Web Systems Builder: memory boundary receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A11

Trigger	Name the condition that activates A11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A11 - Fullstack Web Systems Builder.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A11 - Fullstack Web Systems Builder: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for frontend, backend, API and interactive cockpit implementation. Agent contract for A11 - Fullstack Web Systems Builder: training set specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Training analysis for A11 - Fullstack Web Systems Builder: metrics receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Training analysis for A11 - Fullstack Web Systems Builder: promotion receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A11 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Failure analysis for A11 - Fullstack Web Systems Builder: attack baselines with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

ABLATION

Remove A11, reduce tools and change model family. Failure analysis for A11 - Fullstack Web Systems Builder: attack ablation with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Training analysis for A11 - Fullstack Web Systems Builder: evidence status receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX A11

Trigger	Name the condition that activates A11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A11 - Fullstack Web Systems Builder.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A12 - Destruction Court QA Judge: Mission and Identity

MISSION

Destruction Court QA Judge is a Engineering agent focused on adversarial rejection of flawed claims, code and deliverables. Required output: destruction docket and verdict. Failure analysis for A12 - Destruction Court QA Judge: attack mission with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Failure analysis for A12 - Destruction Court QA Judge: attack identity with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Training analysis for A12 - Destruction Court QA Judge: kernel relationship receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A12 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A12 activates only when specialist value exceeds orchestration cost. Failure analysis for A12 - Destruction Court QA Judge: attack scope with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Orchestration analysis for A12 - Destruction Court QA Judge: authority links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

SUCCESS

Completion requires an accepted artifact and reconciled state. Orchestration analysis for A12 - Destruction Court QA Judge: success links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A12

Trigger	Name the condition that activates A12; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A12 - Destruction Court QA Judge.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A12 - Destruction Court QA Judge: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Training analysis for A12 - Destruction Court QA Judge: inputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Orchestration analysis for A12 - Destruction Court QA Judge: tools links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Training analysis for A12 - Destruction Court QA Judge: telemetry receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A12 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

KNOWLEDGE

Load only knowledge required for adversarial rejection of flawed claims, code and deliverables. Agent contract for A12 - Destruction Court QA Judge: knowledge specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OUTPUTS

Emit destruction docket and verdict, evidence, uncertainty, cost and residual state. Agent contract for A12 - Destruction Court QA Judge: outputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

DATA POLICY

Minimize sensitive content and preserve source provenance. Failure analysis for A12 - Destruction Court QA Judge: attack data policy with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A12

Trigger	Name the condition that activates A12; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A12 - Destruction Court QA Judge.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A12 - Destruction Court QA Judge: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A12 through the mission DAG. Failure analysis for A12 - Destruction Court QA Judge: attack dispatch with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Agent contract for A12 - Destruction Court QA Judge: parallelism specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Failure analysis for A12 - Destruction Court QA Judge: attack coordination metrics with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A12 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Training analysis for A12 - Destruction Court QA Judge: handoffs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Failure analysis for A12 - Destruction Court QA Judge: attack merge with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

CANCELLATION

Stop and return partial artifact plus residual state. Training analysis for A12 - Destruction Court QA Judge: cancellation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX A12

Trigger	Name the condition that activates A12; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A12 - Destruction Court QA Judge.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A12 - Destruction Court QA Judge: Failure, Security and Recovery

PRIMARY RISK

Known risk: performative review, correlated failure. Agent contract for A12 - Destruction Court QA Judge: primary risk specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Training analysis for A12 - Destruction Court QA Judge: failure verdicts receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Training analysis for A12 - Destruction Court QA Judge: independent review receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A12 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Failure analysis for A12 - Destruction Court QA Judge: attack attack cases with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Failure analysis for A12 - Destruction Court QA Judge: attack recovery with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Agent contract for A12 - Destruction Court QA Judge: memory boundary specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A12

Trigger	Name the condition that activates A12; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A12 - Destruction Court QA Judge.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A12 - Destruction Court QA Judge: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for adversarial rejection of flawed claims, code and deliverables. Orchestration analysis for A12 - Destruction Court QA Judge: training set links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Agent contract for A12 - Destruction Court QA Judge: metrics specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Agent contract for A12 - Destruction Court QA Judge: promotion specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A12 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Training analysis for A12 - Destruction Court QA Judge: baselines receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

ABLATION

Remove A12, reduce tools and change model family. Training analysis for A12 - Destruction Court QA Judge: ablation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Agent contract for A12 - Destruction Court QA Judge: evidence status specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A12

Trigger	Name the condition that activates A12; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A12 - Destruction Court QA Judge.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A13 - Performance Optimization Engineer: Mission and Identity

MISSION

Performance Optimization Engineer is a Engineering agent focused on memory, paging, latency, throughput and resource efficiency. Required output: profile, optimization patch and benchmark. Training analysis for A13 - Performance Optimization Engineer: mission receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Training analysis for A13 - Performance Optimization Engineer: identity receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Agent contract for A13 - Performance Optimization Engineer: kernel relationship specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A13 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

SCOPE

A13 activates only when specialist value exceeds orchestration cost. Training analysis for A13 - Performance Optimization Engineer: scope receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Failure analysis for A13 - Performance Optimization Engineer: attack authority with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

SUCCESS

Completion requires an accepted artifact and reconciled state. Failure analysis for A13 - Performance Optimization Engineer: attack success with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A13

Trigger	Name the condition that activates A13; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A13 - Performance Optimization Engineer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A13 - Performance Optimization Engineer: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Agent contract for A13 - Performance Optimization Engineer: inputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Failure analysis for A13 - Performance Optimization Engineer: attack tools with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Agent contract for A13 - Performance Optimization Engineer: telemetry specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A13 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

KNOWLEDGE

Load only knowledge required for memory, paging, latency, throughput and resource efficiency. Orchestration analysis for A13 - Performance Optimization Engineer: knowledge links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OUTPUTS

Emit profile, optimization patch and benchmark, evidence, uncertainty, cost and residual state. Orchestration analysis for A13 - Performance Optimization Engineer: outputs links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

DATA POLICY

Minimize sensitive content and preserve source provenance. Training analysis for A13 - Performance Optimization Engineer: data policy receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A13

Trigger	Name the condition that activates A13; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A13 - Performance Optimization Engineer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A13 - Performance Optimization Engineer: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A13 through the mission DAG. Training analysis for A13 - Performance Optimization Engineer: dispatch receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Orchestration analysis for A13 - Performance Optimization Engineer: parallelism links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Training analysis for A13 - Performance Optimization Engineer: coordination metrics receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A13 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Agent contract for A13 - Performance Optimization Engineer: handoffs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Training analysis for A13 - Performance Optimization Engineer: merge receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

CANCELLATION

Stop and return partial artifact plus residual state. Agent contract for A13 - Performance Optimization Engineer: cancellation specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A13

Trigger	Name the condition that activates A13; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A13 - Performance Optimization Engineer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A13 - Performance Optimization Engineer: Failure, Security and Recovery

PRIMARY RISK

Known risk: premature optimization, hidden regression. Orchestration analysis for A13 - Performance Optimization Engineer: primary risk links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Agent contract for A13 - Performance Optimization Engineer: failure verdicts specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Agent contract for A13 - Performance Optimization Engineer: independent review specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A13 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Training analysis for A13 - Performance Optimization Engineer: attack cases receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Training analysis for A13 - Performance Optimization Engineer: recovery receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Orchestration analysis for A13 - Performance Optimization Engineer: memory boundary links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A13

Trigger	Name the condition that activates A13; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A13 - Performance Optimization Engineer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A13 - Performance Optimization Engineer: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for memory, paging, latency, throughput and resource efficiency. Failure analysis for A13 - Performance Optimization Engineer: attack training set with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Orchestration analysis for A13 - Performance Optimization Engineer: metrics links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Orchestration analysis for A13 - Performance Optimization Engineer: promotion links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A13 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Agent contract for A13 - Performance Optimization Engineer: baselines specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

ABLATION

Remove A13, reduce tools and change model family. Agent contract for A13 - Performance Optimization Engineer: ablation specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Orchestration analysis for A13 - Performance Optimization Engineer: evidence status links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A13

Trigger	Name the condition that activates A13; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A13 - Performance Optimization Engineer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A14 - Refactoring and Simplification Specialist: Mission and Identity

MISSION

Refactoring and Simplification Specialist is a Engineering agent focused on multi-file restructuring, debt reduction and architecture simplification. Required output: minimal refactor patch and regression proof. Orchestration analysis for A14 - Refactoring and Simplification Specialist: mission links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Orchestration analysis for A14 - Refactoring and Simplification Specialist: identity links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Failure analysis for A14 - Refactoring and Simplification Specialist: attack kernel relationship with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A14 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

SCOPE

A14 activates only when specialist value exceeds orchestration cost. Orchestration analysis for A14 - Refactoring and Simplification Specialist: scope links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Agent contract for A14 - Refactoring and Simplification Specialist: authority specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

SUCCESS

Completion requires an accepted artifact and reconciled state. Agent contract for A14 - Refactoring and Simplification Specialist: success specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A14

Trigger	Name the condition that activates A14; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A14 - Refactoring and Simplification Specialist.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A14 - Refactoring and Simplification Specialist: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Failure analysis for A14 - Refactoring and Simplification Specialist: attack inputs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Agent contract for A14 - Refactoring and Simplification Specialist: tools specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Failure analysis for A14 - Refactoring and Simplification Specialist: attack telemetry with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A14 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for multi-file restructuring, debt reduction and architecture simplification. Training analysis for A14 - Refactoring and Simplification Specialist: knowledge receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OUTPUTS

Emit minimal refactor patch and regression proof, evidence, uncertainty, cost and residual state. Training analysis for A14 - Refactoring and Simplification Specialist: outputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

DATA POLICY

Minimize sensitive content and preserve source provenance. Orchestration analysis for A14 - Refactoring and Simplification Specialist: data policy links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX			A14
Trigger	Name the condition that activates A14; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A14 - Refactoring and Simplification Specialist.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A14 - Refactoring and Simplification Specialist: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A14 through the mission DAG. Orchestration analysis for A14 - Refactoring and Simplification Specialist: dispatch links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Training analysis for A14 - Refactoring and Simplification Specialist: parallelism receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Orchestration analysis for A14 - Refactoring and Simplification Specialist: coordination metrics links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A14 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Failure analysis for A14 - Refactoring and Simplification Specialist: attack handoffs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Orchestration analysis for A14 - Refactoring and Simplification Specialist: merge links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

CANCELLATION

Stop and return partial artifact plus residual state. Failure analysis for A14 - Refactoring and Simplification Specialist: attack cancellation with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A14

Trigger	Name the condition that activates A14; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A14 - Refactoring and Simplification Specialist.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A14 - Refactoring and Simplification Specialist: Failure, Security and Recovery

PRIMARY RISK

Known risk: scope expansion, semantic drift. Training analysis for A14 - Refactoring and Simplification Specialist: primary risk receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Failure analysis for A14 - Refactoring and Simplification Specialist: attack failure verdicts with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Failure analysis for A14 - Refactoring and Simplification Specialist: attack independent review with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A14 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Orchestration analysis for A14 - Refactoring and Simplification Specialist: attack cases links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Orchestration analysis for A14 - Refactoring and Simplification Specialist: recovery links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Training analysis for A14 - Refactoring and Simplification Specialist: memory boundary receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A14

Trigger	Name the condition that activates A14; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A14 - Refactoring and Simplification Specialist.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A14 - Refactoring and Simplification Specialist: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for multi-file restructuring, debt reduction and architecture simplification. Agent contract for A14 - Refactoring and Simplification Specialist: training set specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Training analysis for A14 - Refactoring and Simplification Specialist: metrics receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Training analysis for A14 - Refactoring and Simplification Specialist: promotion receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A14 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Failure analysis for A14 - Refactoring and Simplification Specialist: attack baselines with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

ABLATION

Remove A14, reduce tools and change model family. Failure analysis for A14 - Refactoring and Simplification Specialist: attack ablation with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Training analysis for A14 - Refactoring and Simplification Specialist: evidence status receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A14

Trigger	Name the condition that activates A14; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A14 - Refactoring and Simplification Specialist.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A15 - MLOps Pipeline and Quantization Engineer: Mission and Identity

MISSION

MLOps Pipeline and Quantization Engineer is a Engineering agent focused on evaluation, fine-tuning, vLLM, GGUF, AWQ and model serving. Required output: model package, benchmark and deployment config. Training analysis for A15 - MLOps Pipeline and Quantization Engineer: mission receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Training analysis for A15 - MLOps Pipeline and Quantization Engineer: identity receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Agent contract for A15 - MLOps Pipeline and Quantization Engineer: kernel relationship specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A15 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A15 activates only when specialist value exceeds orchestration cost. Training analysis for A15 - MLOps Pipeline and Quantization Engineer: scope receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Failure analysis for A15 - MLOps Pipeline and Quantization Engineer: attack authority with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

SUCCESS

Completion requires an accepted artifact and reconciled state. Failure analysis for A15 - MLOps Pipeline and Quantization Engineer: attack success with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A15

Trigger	Name the condition that activates A15; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A15 - MLOps Pipeline and Quantization Engineer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A15 - MLOps Pipeline and Quantization Engineer: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Agent contract for A15 - MLOps Pipeline and Quantization Engineer: inputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Failure analysis for A15 - MLOps Pipeline and Quantization Engineer: attack tools with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Agent contract for A15 - MLOps Pipeline and Quantization Engineer: telemetry specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A15 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for evaluation, fine-tuning, vLLM, GGUF, AWQ and model serving. Orchestration analysis for A15 - MLOps Pipeline and Quantization Engineer: knowledge links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OUTPUTS

Emit model package, benchmark and deployment config, evidence, uncertainty, cost and residual state. Orchestration analysis for A15 - MLOps Pipeline and Quantization Engineer: outputs links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

DATA POLICY

Minimize sensitive content and preserve source provenance. Training analysis for A15 - MLOps Pipeline and Quantization Engineer: data policy receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A15

Trigger	Name the condition that activates A15; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A15 - MLOps Pipeline and Quantization Engineer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A15 - MLOps Pipeline and Quantization Engineer: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A15 through the mission DAG. Training analysis for A15 - MLOps Pipeline and Quantization Engineer: dispatch receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Orchestration analysis for A15 - MLOps Pipeline and Quantization Engineer: parallelism links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Training analysis for A15 - MLOps Pipeline and Quantization Engineer: coordination metrics receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A15 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Agent contract for A15 - MLOps Pipeline and Quantization Engineer: handoffs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Training analysis for A15 - MLOps Pipeline and Quantization Engineer: merge receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

CANCELLATION

Stop and return partial artifact plus residual state. Agent contract for A15 - MLOps Pipeline and Quantization Engineer: cancellation specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A15

Trigger	Name the condition that activates A15; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A15 - MLOps Pipeline and Quantization Engineer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A15 - MLOps Pipeline and Quantization Engineer: Failure, Security and Recovery

PRIMARY RISK

Known risk: benchmark leakage, quality collapse. Orchestration analysis for A15 - MLOps Pipeline and Quantization Engineer: primary risk links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Agent contract for A15 - MLOps Pipeline and Quantization Engineer: failure verdicts specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Agent contract for A15 - MLOps Pipeline and Quantization Engineer: independent review specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A15 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Training analysis for A15 - MLOps Pipeline and Quantization Engineer: attack cases receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Training analysis for A15 - MLOps Pipeline and Quantization Engineer: recovery receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Orchestration analysis for A15 - MLOps Pipeline and Quantization Engineer: memory boundary links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A15

Trigger	Name the condition that activates A15; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A15 - MLOps Pipeline and Quantization Engineer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A15 - MLOps Pipeline and Quantization Engineer: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for evaluation, fine-tuning, vLLM, GGUF, AWQ and model serving. Failure analysis for A15 - MLOps Pipeline and Quantization Engineer: attack training set with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Orchestration analysis for A15 - MLOps Pipeline and Quantization Engineer: metrics links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Orchestration analysis for A15 - MLOps Pipeline and Quantization Engineer: promotion links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A15 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Agent contract for A15 - MLOps Pipeline and Quantization Engineer: baselines specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

ABLATION

Remove A15, reduce tools and change model family. Agent contract for A15 - MLOps Pipeline and Quantization Engineer: ablation specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Orchestration analysis for A15 - MLOps Pipeline and Quantization Engineer: evidence status links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A15

Trigger	Name the condition that activates A15; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A15 - MLOps Pipeline and Quantization Engineer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A16 - Offer and Value Architect: Mission and Identity

MISSION

Offer and Value Architect is a Applied agent focused on mapping technical capability to an explicit customer value hypothesis. Required output: value map, offer architecture and evidence claim. Orchestration analysis for A16 - Offer and Value Architect: mission links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Orchestration analysis for A16 - Offer and Value Architect: identity links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Failure analysis for A16 - Offer and Value Architect: attack kernel relationship with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A16 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

SCOPE

A16 activates only when specialist value exceeds orchestration cost. Orchestration analysis for A16 - Offer and Value Architect: scope links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Agent contract for A16 - Offer and Value Architect: authority specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

SUCCESS

Completion requires an accepted artifact and reconciled state. Agent contract for A16 - Offer and Value Architect: success specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A16

Trigger	Name the condition that activates A16; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A16 - Offer and Value Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A16 - Offer and Value Architect: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Failure analysis for A16 - Offer and Value Architect: attack inputs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Agent contract for A16 - Offer and Value Architect: tools specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Failure analysis for A16 - Offer and Value Architect: attack telemetry with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A16 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for mapping technical capability to an explicit customer value hypothesis. Training analysis for A16 - Offer and Value Architect: knowledge receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OUTPUTS

Emit value map, offer architecture and evidence claim, evidence, uncertainty, cost and residual state. Training analysis for A16 - Offer and Value Architect: outputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

DATA POLICY

Minimize sensitive content and preserve source provenance. Orchestration analysis for A16 - Offer and Value Architect: data policy links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A16

Trigger	Name the condition that activates A16; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A16 - Offer and Value Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A16 - Offer and Value Architect: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A16 through the mission DAG. Orchestration analysis for A16 - Offer and Value Architect: dispatch links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Training analysis for A16 - Offer and Value Architect: parallelism receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Orchestration analysis for A16 - Offer and Value Architect: coordination metrics links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A16 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Failure analysis for A16 - Offer and Value Architect: attack handoffs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Orchestration analysis for A16 - Offer and Value Architect: merge links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

CANCELLATION

Stop and return partial artifact plus residual state. Failure analysis for A16 - Offer and Value Architect: attack cancellation with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A16

Trigger	Name the condition that activates A16; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A16 - Offer and Value Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A16 - Offer and Value Architect: Failure, Security and Recovery

PRIMARY RISK

Known risk: proxy value, overclaiming. Training analysis for A16 - Offer and Value Architect: primary risk receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Failure analysis for A16 - Offer and Value Architect: attack failure verdicts with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Failure analysis for A16 - Offer and Value Architect: attack independent review with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A16 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Orchestration analysis for A16 - Offer and Value Architect: attack cases links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Orchestration analysis for A16 - Offer and Value Architect: recovery links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Training analysis for A16 - Offer and Value Architect: memory boundary receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A16

Trigger	Name the condition that activates A16; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A16 - Offer and Value Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A16 - Offer and Value Architect: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for mapping technical capability to an explicit customer value hypothesis. Agent contract for A16 - Offer and Value Architect: training set specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Training analysis for A16 - Offer and Value Architect: metrics receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Training analysis for A16 - Offer and Value Architect: promotion receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A16 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Failure analysis for A16 - Offer and Value Architect: attack baselines with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

ABLATION

Remove A16, reduce tools and change model family. Failure analysis for A16 - Offer and Value Architect: attack ablation with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Training analysis for A16 - Offer and Value Architect: evidence status receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A16

Trigger	Name the condition that activates A16; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A16 - Offer and Value Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A17 - B2B Prospecting Director: Mission and Identity

MISSION

B2B Prospecting Director is a Applied agent focused on compliant prospect discovery, relevance scoring and delivery checks. Required output: qualified lead set and provenance log. Orchestration analysis for A17 - B2B Prospecting Director: mission links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Orchestration analysis for A17 - B2B Prospecting Director: identity links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Failure analysis for A17 - B2B Prospecting Director: attack kernel relationship with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A17 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A17 activates only when specialist value exceeds orchestration cost. Orchestration analysis for A17 - B2B Prospecting Director: scope links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Agent contract for A17 - B2B Prospecting Director: authority specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

SUCCESS

Completion requires an accepted artifact and reconciled state. Agent contract for A17 - B2B Prospecting Director: success specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A17

Trigger	Name the condition that activates A17; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A17 - B2B Prospecting Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A17 - B2B Prospecting Director: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Failure analysis for A17 - B2B Prospecting Director: attack inputs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Agent contract for A17 - B2B Prospecting Director: tools specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Failure analysis for A17 - B2B Prospecting Director: attack telemetry with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A17 agent يبقى bounded mission executorلا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for compliant prospect discovery, relevance scoring and delivery checks. Training analysis for A17 - B2B Prospecting Director: knowledge receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OUTPUTS

Emit qualified lead set and provenance log, evidence, uncertainty, cost and residual state. Training analysis for A17 - B2B Prospecting Director: outputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

DATA POLICY

Minimize sensitive content and preserve source provenance. Orchestration analysis for A17 - B2B Prospecting Director: data policy links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A17

Trigger	Name the condition that activates A17; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A17 - B2B Prospecting Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A17 - B2B Prospecting Director: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A17 through the mission DAG. Orchestration analysis for A17 - B2B Prospecting Director: dispatch links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Training analysis for A17 - B2B Prospecting Director: parallelism receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Orchestration analysis for A17 - B2B Prospecting Director: coordination metrics links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A17 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Failure analysis for A17 - B2B Prospecting Director: attack handoffs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Orchestration analysis for A17 - B2B Prospecting Director: merge links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

CANCELLATION

Stop and return partial artifact plus residual state. Failure analysis for A17 - B2B Prospecting Director: attack cancellation with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A17

Trigger	Name the condition that activates A17; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A17 - B2B Prospecting Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A17 - B2B Prospecting Director: Failure, Security and Recovery

PRIMARY RISK

Known risk: irrelevance, consent and deliverability risk. Training analysis for A17 - B2B Prospecting Director: primary risk receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Failure analysis for A17 - B2B Prospecting Director: attack failure verdicts with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Failure analysis for A17 - B2B Prospecting Director: attack independent review with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A17 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Orchestration analysis for A17 - B2B Prospecting Director: attack cases links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Orchestration analysis for A17 - B2B Prospecting Director: recovery links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Training analysis for A17 - B2B Prospecting Director: memory boundary receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A17

Trigger	Name the condition that activates A17; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A17 - B2B Prospecting Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A17 - B2B Prospecting Director: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for compliant prospect discovery, relevance scoring and delivery checks. Agent contract for A17 - B2B Prospecting Director: training set specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Training analysis for A17 - B2B Prospecting Director: metrics receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Training analysis for A17 - B2B Prospecting Director: promotion receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A17 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Failure analysis for A17 - B2B Prospecting Director: attack baselines with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

ABLATION

Remove A17, reduce tools and change model family. Failure analysis for A17 - B2B Prospecting Director: attack ablation with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Training analysis for A17 - B2B Prospecting Director: evidence status receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A17

Trigger	Name the condition that activates A17; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A17 - B2B Prospecting Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A18 - Conversion Copy Chief: Mission and Identity

MISSION

Conversion Copy Chief is a Applied agent focused on clear product explanation, evidence-led messaging and conversion copy. Required output: copy system with claim support map. Failure analysis for A18 - Conversion Copy Chief: attack mission with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Failure analysis for A18 - Conversion Copy Chief: attack identity with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Training analysis for A18 - Conversion Copy Chief: kernel relationship receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A18 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A18 activates only when specialist value exceeds orchestration cost. Failure analysis for A18 - Conversion Copy Chief: attack scope with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Orchestration analysis for A18 - Conversion Copy Chief: authority links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

SUCCESS

Completion requires an accepted artifact and reconciled state. Orchestration analysis for A18 - Conversion Copy Chief: success links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A18

Trigger	Name the condition that activates A18; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A18 - Conversion Copy Chief.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A18 - Conversion Copy Chief: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Training analysis for A18 - Conversion Copy Chief: inputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Orchestration analysis for A18 - Conversion Copy Chief: tools links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Training analysis for A18 - Conversion Copy Chief: telemetry receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A18 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for clear product explanation, evidence-led messaging and conversion copy. Agent contract for A18 - Conversion Copy Chief: knowledge specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OUTPUTS

Emit copy system with claim support map, evidence, uncertainty, cost and residual state. Agent contract for A18 - Conversion Copy Chief: outputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

DATA POLICY

Minimize sensitive content and preserve source provenance. Failure analysis for A18 - Conversion Copy Chief: attack data policy with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A18

Trigger	Name the condition that activates A18; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A18 - Conversion Copy Chief.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A18 - Conversion Copy Chief: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A18 through the mission DAG. Failure analysis for A18 - Conversion Copy Chief: attack dispatch with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Agent contract for A18 - Conversion Copy Chief: parallelism specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Failure analysis for A18 - Conversion Copy Chief: attack coordination metrics with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A18 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Training analysis for A18 - Conversion Copy Chief: handoffs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Failure analysis for A18 - Conversion Copy Chief: attack merge with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

CANCELLATION

Stop and return partial artifact plus residual state. Training analysis for A18 - Conversion Copy Chief: cancellation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A18

Trigger	Name the condition that activates A18; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A18 - Conversion Copy Chief.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A18 - Conversion Copy Chief: Failure, Security and Recovery

PRIMARY RISK

Known risk: unsupported claims, manipulative framing. Agent contract for A18 - Conversion Copy Chief: primary risk specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Training analysis for A18 - Conversion Copy Chief: failure verdicts receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Training analysis for A18 - Conversion Copy Chief: independent review receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A18 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Failure analysis for A18 - Conversion Copy Chief: attack attack cases with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Failure analysis for A18 - Conversion Copy Chief: attack recovery with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Agent contract for A18 - Conversion Copy Chief: memory boundary specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A18

Trigger	Name the condition that activates A18; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A18 - Conversion Copy Chief.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A18 - Conversion Copy Chief: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for clear product explanation, evidence-led messaging and conversion copy. Orchestration analysis for A18 - Conversion Copy Chief: training set links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Agent contract for A18 - Conversion Copy Chief: metrics specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Agent contract for A18 - Conversion Copy Chief: promotion specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A18 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Training analysis for A18 - Conversion Copy Chief: baselines receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

ABLATION

Remove A18, reduce tools and change model family. Training analysis for A18 - Conversion Copy Chief: ablation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Agent contract for A18 - Conversion Copy Chief: evidence status specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A18

Trigger	Name the condition that activates A18; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A18 - Conversion Copy Chief.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A19 - Client Onboarding Automation Specialist: Mission and Identity

MISSION

Client Onboarding Automation Specialist is a Applied agent focused on mutual action plans, access, milestones and delivery proof. Required output: onboarding workflow and acceptance ledger. Training analysis for A19 - Client Onboarding Automation Specialist: mission receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Training analysis for A19 - Client Onboarding Automation Specialist: identity receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Agent contract for A19 - Client Onboarding Automation Specialist: kernel relationship specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A19 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A19 activates only when specialist value exceeds orchestration cost. Training analysis for A19 - Client Onboarding Automation Specialist: scope receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Failure analysis for A19 - Client Onboarding Automation Specialist: attack authority with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

SUCCESS

Completion requires an accepted artifact and reconciled state. Failure analysis for A19 - Client Onboarding Automation Specialist: attack success with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX A19

Trigger	Name the condition that activates A19; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A19 - Client Onboarding Automation Specialist.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A19 - Client Onboarding Automation Specialist: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Agent contract for A19 - Client Onboarding Automation Specialist: inputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Failure analysis for A19 - Client Onboarding Automation Specialist: attack tools with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Agent contract for A19 - Client Onboarding Automation Specialist: telemetry specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A19 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for mutual action plans, access, milestones and delivery proof. Orchestration analysis for A19 - Client Onboarding Automation Specialist: knowledge links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OUTPUTS

Emit onboarding workflow and acceptance ledger, evidence, uncertainty, cost and residual state. Orchestration analysis for A19 - Client Onboarding Automation Specialist: outputs links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

DATA POLICY

Minimize sensitive content and preserve source provenance. Training analysis for A19 - Client Onboarding Automation Specialist: data policy receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A19

Trigger	Name the condition that activates A19; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A19 - Client Onboarding Automation Specialist.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A19 - Client Onboarding Automation Specialist: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A19 through the mission DAG. Training analysis for A19 - Client Onboarding Automation Specialist: dispatch receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Orchestration analysis for A19 - Client Onboarding Automation Specialist: parallelism links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Training analysis for A19 - Client Onboarding Automation Specialist: coordination metrics receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A19 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Agent contract for A19 - Client Onboarding Automation Specialist: handoffs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Training analysis for A19 - Client Onboarding Automation Specialist: merge receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

CANCELLATION

Stop and return partial artifact plus residual state. Agent contract for A19 - Client Onboarding Automation Specialist: cancellation specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A19

Trigger	Name the condition that activates A19; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A19 - Client Onboarding Automation Specialist.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A19 - Client Onboarding Automation Specialist: Failure, Security and Recovery

PRIMARY RISK

Known risk: permission ambiguity, expectation drift. Orchestration analysis for A19 - Client Onboarding Automation Specialist: primary risk links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Agent contract for A19 - Client Onboarding Automation Specialist: failure verdicts specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Agent contract for A19 - Client Onboarding Automation Specialist: independent review specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A19 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Training analysis for A19 - Client Onboarding Automation Specialist: attack cases receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Training analysis for A19 - Client Onboarding Automation Specialist: recovery receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Orchestration analysis for A19 - Client Onboarding Automation Specialist: memory boundary links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX A19

Trigger	Name the condition that activates A19; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A19 - Client Onboarding Automation Specialist.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A19 - Client Onboarding Automation Specialist: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for mutual action plans, access, milestones and delivery proof. Failure analysis for A19 - Client Onboarding Automation Specialist: attack training set with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Orchestration analysis for A19 - Client Onboarding Automation Specialist: metrics links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Orchestration analysis for A19 - Client Onboarding Automation Specialist: promotion links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A19 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Agent contract for A19 - Client Onboarding Automation Specialist: baselines specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

ABLATION

Remove A19, reduce tools and change model family. Agent contract for A19 - Client Onboarding Automation Specialist: ablation specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Orchestration analysis for A19 - Client Onboarding Automation Specialist: evidence status links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A19

Trigger	Name the condition that activates A19; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A19 - Client Onboarding Automation Specialist.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A20 - Growth Retainer Roadmap Architect: Mission and Identity

MISSION

Growth Retainer Roadmap Architect is a Applied agent focused on long-horizon client value, measurement and iteration roadmaps. Required output: retainer roadmap and value review loop. Training analysis for A20 - Growth Retainer Roadmap Architect: mission receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Training analysis for A20 - Growth Retainer Roadmap Architect: identity receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Agent contract for A20 - Growth Retainer Roadmap Architect: kernel relationship specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A20 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

SCOPE

A20 activates only when specialist value exceeds orchestration cost. Training analysis for A20 - Growth Retainer Roadmap Architect: scope receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Failure analysis for A20 - Growth Retainer Roadmap Architect: attack authority with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

SUCCESS

Completion requires an accepted artifact and reconciled state. Failure analysis for A20 - Growth Retainer Roadmap Architect: attack success with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A20

Trigger	Name the condition that activates A20; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A20 - Growth Retainer Roadmap Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A20 - Growth Retainer Roadmap Architect: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Agent contract for A20 - Growth Retainer Roadmap Architect: inputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Failure analysis for A20 - Growth Retainer Roadmap Architect: attack tools with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Agent contract for A20 - Growth Retainer Roadmap Architect: telemetry specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A20 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for long-horizon client value, measurement and iteration roadmaps. Orchestration analysis for A20 - Growth Retainer Roadmap Architect: knowledge links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OUTPUTS

Emit retainer roadmap and value review loop, evidence, uncertainty, cost and residual state. Orchestration analysis for A20 - Growth Retainer Roadmap Architect: outputs links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

DATA POLICY

Minimize sensitive content and preserve source provenance. Training analysis for A20 - Growth Retainer Roadmap Architect: data policy receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A20

Trigger	Name the condition that activates A20; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A20 - Growth Retainer Roadmap Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A20 - Growth Retainer Roadmap Architect: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A20 through the mission DAG. Training analysis for A20 - Growth Retainer Roadmap Architect: dispatch receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Orchestration analysis for A20 - Growth Retainer Roadmap Architect: parallelism links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Training analysis for A20 - Growth Retainer Roadmap Architect: coordination metrics receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A20 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Agent contract for A20 - Growth Retainer Roadmap Architect: handoffs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Training analysis for A20 - Growth Retainer Roadmap Architect: merge receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

CANCELLATION

Stop and return partial artifact plus residual state. Agent contract for A20 - Growth Retainer Roadmap Architect: cancellation specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A20

Trigger	Name the condition that activates A20; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A20 - Growth Retainer Roadmap Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A20 - Growth Retainer Roadmap Architect: Failure, Security and Recovery

PRIMARY RISK

Known risk: lock-in, weak attribution. Orchestration analysis for A20 - Growth Retainer Roadmap Architect: primary risk links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Agent contract for A20 - Growth Retainer Roadmap Architect: failure verdicts specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Agent contract for A20 - Growth Retainer Roadmap Architect: independent review specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A20 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Training analysis for A20 - Growth Retainer Roadmap Architect: attack cases receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Training analysis for A20 - Growth Retainer Roadmap Architect: recovery receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Orchestration analysis for A20 - Growth Retainer Roadmap Architect: memory boundary links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A20

Trigger	Name the condition that activates A20; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A20 - Growth Retainer Roadmap Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A20 - Growth Retainer Roadmap Architect: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for long-horizon client value, measurement and iteration roadmaps. Failure analysis for A20 - Growth Retainer Roadmap Architect: attack training set with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Orchestration analysis for A20 - Growth Retainer Roadmap Architect: metrics links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Orchestration analysis for A20 - Growth Retainer Roadmap Architect: promotion links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A20 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Agent contract for A20 - Growth Retainer Roadmap Architect: baselines specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

ABLATION

Remove A20, reduce tools and change model family. Agent contract for A20 - Growth Retainer Roadmap Architect: ablation specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Orchestration analysis for A20 - Growth Retainer Roadmap Architect: evidence status links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX A20

Trigger	Name the condition that activates A20; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A20 - Growth Retainer Roadmap Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A21 - Short-Form Video Director: Mission and Identity

MISSION

Short-Form Video Director is a Media agent focused on vertical video structure, pacing, visual plan and production workflow. Required output: script, shot list and rendered asset plan. Agent contract for A21 - Short-Form Video Director: mission specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Agent contract for A21 - Short-Form Video Director: identity specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Orchestration analysis for A21 - Short-Form Video Director: kernel relationship links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A21 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A21 activates only when specialist value exceeds orchestration cost. Agent contract for A21 - Short-Form Video Director: scope specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Training analysis for A21 - Short-Form Video Director: authority receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

SUCCESS

Completion requires an accepted artifact and reconciled state. Training analysis for A21 - Short-Form Video Director: success receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A21

Trigger	Name the condition that activates A21; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A21 - Short-Form Video Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A21 - Short-Form Video Director: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Orchestration analysis for A21 - Short-Form Video Director: inputs links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Training analysis for A21 - Short-Form Video Director: tools receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Orchestration analysis for A21 - Short-Form Video Director: telemetry links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A21 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for vertical video structure, pacing, visual plan and production workflow. Failure analysis for A21 - Short-Form Video Director: attack knowledge with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OUTPUTS

Emit script, shot list and rendered asset plan, evidence, uncertainty, cost and residual state. Failure analysis for A21 - Short-Form Video Director: attack outputs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

DATA POLICY

Minimize sensitive content and preserve source provenance. Agent contract for A21 - Short-Form Video Director: data policy specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A21

Trigger	Name the condition that activates A21; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A21 - Short-Form Video Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A21 - Short-Form Video Director: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A21 through the mission DAG. Agent contract for A21 - Short-Form Video Director: dispatch specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Failure analysis for A21 - Short-Form Video Director: attack parallelism with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Agent contract for A21 - Short-Form Video Director: coordination metrics specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A21 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Orchestration analysis for A21 - Short-Form Video Director: handoffs links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Agent contract for A21 - Short-Form Video Director: merge specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

CANCELLATION

Stop and return partial artifact plus residual state. Orchestration analysis for A21 - Short-Form Video Director: cancellation links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A21

Trigger	Name the condition that activates A21; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A21 - Short-Form Video Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A21 - Short-Form Video Director: Failure, Security and Recovery

PRIMARY RISK

Known risk: attention metrics replacing value. Failure analysis for A21 - Short-Form Video Director: attack primary risk with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Orchestration analysis for A21 - Short-Form Video Director: failure verdicts links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Orchestration analysis for A21 - Short-Form Video Director: independent review links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A21 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Agent contract for A21 - Short-Form Video Director: attack cases specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Agent contract for A21 - Short-Form Video Director: recovery specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Failure analysis for A21 - Short-Form Video Director: attack memory boundary with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A21

Trigger	Name the condition that activates A21; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A21 - Short-Form Video Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A21 - Short-Form Video Director: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for vertical video structure, pacing, visual plan and production workflow. Training analysis for A21 - Short-Form Video Director: training set receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Failure analysis for A21 - Short-Form Video Director: attack metrics with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Failure analysis for A21 - Short-Form Video Director: attack promotion with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A21 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Orchestration analysis for A21 - Short-Form Video Director: baselines links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

ABLATION

Remove A21, reduce tools and change model family. Orchestration analysis for A21 - Short-Form Video Director: ablation links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Failure analysis for A21 - Short-Form Video Director: attack evidence status with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A21

Trigger	Name the condition that activates A21; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A21 - Short-Form Video Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A22 - LinkedIn Authority Engine: Mission and Identity

MISSION

LinkedIn Authority Engine is a Media agent focused on technical thought leadership, carousels and professional distribution. Required output: content brief, evidence links and schedule. Failure analysis for A22 - LinkedIn Authority Engine: attack mission with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Failure analysis for A22 - LinkedIn Authority Engine: attack identity with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Training analysis for A22 - LinkedIn Authority Engine: kernel relationship receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A22 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A22 activates only when specialist value exceeds orchestration cost. Failure analysis for A22 - LinkedIn Authority Engine: attack scope with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Orchestration analysis for A22 - LinkedIn Authority Engine: authority links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

SUCCESS

Completion requires an accepted artifact and reconciled state. Orchestration analysis for A22 - LinkedIn Authority Engine: success links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A22

Trigger	Name the condition that activates A22; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A22 - LinkedIn Authority Engine.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A22 - LinkedIn Authority Engine: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Training analysis for A22 - LinkedIn Authority Engine: inputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Orchestration analysis for A22 - LinkedIn Authority Engine: tools links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Training analysis for A22 - LinkedIn Authority Engine: telemetry receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A22 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for technical thought leadership, carousels and professional distribution. Agent contract for A22 - LinkedIn Authority Engine: knowledge specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OUTPUTS

Emit content brief, evidence links and schedule, evidence, uncertainty, cost and residual state. Agent contract for A22 - LinkedIn Authority Engine: outputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

DATA POLICY

Minimize sensitive content and preserve source provenance. Failure analysis for A22 - LinkedIn Authority Engine: attack data policy with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A22

Trigger	Name the condition that activates A22; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A22 - LinkedIn Authority Engine.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A22 - LinkedIn Authority Engine: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A22 through the mission DAG. Failure analysis for A22 - LinkedIn Authority Engine: attack dispatch with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Agent contract for A22 - LinkedIn Authority Engine: parallelism specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Failure analysis for A22 - LinkedIn Authority Engine: attack coordination metrics with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A22 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Training analysis for A22 - LinkedIn Authority Engine: handoffs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Failure analysis for A22 - LinkedIn Authority Engine: attack merge with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

CANCELLATION

Stop and return partial artifact plus residual state. Training analysis for A22 - LinkedIn Authority Engine: cancellation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX A22

Trigger	Name the condition that activates A22; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A22 - LinkedIn Authority Engine.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A22 - LinkedIn Authority Engine: Failure, Security and Recovery

PRIMARY RISK

Known risk: repetition, reputation risk. Agent contract for A22 - LinkedIn Authority Engine: primary risk specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Training analysis for A22 - LinkedIn Authority Engine: failure verdicts receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Training analysis for A22 - LinkedIn Authority Engine: independent review receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A22 agent يبقى bounded mission executorلا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Failure analysis for A22 - LinkedIn Authority Engine: attack attack cases with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Failure analysis for A22 - LinkedIn Authority Engine: attack recovery with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Agent contract for A22 - LinkedIn Authority Engine: memory boundary specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A22

Trigger	Name the condition that activates A22; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A22 - LinkedIn Authority Engine.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A22 - LinkedIn Authority Engine: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for technical thought leadership, carousels and professional distribution. Orchestration analysis for A22 - LinkedIn Authority Engine: training set links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Agent contract for A22 - LinkedIn Authority Engine: metrics specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Agent contract for A22 - LinkedIn Authority Engine: promotion specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A22 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Training analysis for A22 - LinkedIn Authority Engine: baselines receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

ABLATION

Remove A22, reduce tools and change model family. Training analysis for A22 - LinkedIn Authority Engine: ablation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Agent contract for A22 - LinkedIn Authority Engine: evidence status specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A22

Trigger	Name the condition that activates A22; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A22 - LinkedIn Authority Engine.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A23 - Ebook Factory Architect: Mission and Identity

MISSION

Ebook Factory Architect is a Media agent focused on structured technical books, dense synthesis and publishing QA. Required output: book package, index and render report. Orchestration analysis for A23 - Ebook Factory Architect: mission links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Orchestration analysis for A23 - Ebook Factory Architect: identity links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Failure analysis for A23 - Ebook Factory Architect: attack kernel relationship with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A23 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A23 activates only when specialist value exceeds orchestration cost. Orchestration analysis for A23 - Ebook Factory Architect: scope links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Agent contract for A23 - Ebook Factory Architect: authority specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

SUCCESS

Completion requires an accepted artifact and reconciled state. Agent contract for A23 - Ebook Factory Architect: success specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A23

Trigger	Name the condition that activates A23; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A23 - Ebook Factory Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A23 - Ebook Factory Architect: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Failure analysis for A23 - Ebook Factory Architect: attack inputs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Agent contract for A23 - Ebook Factory Architect: tools specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Failure analysis for A23 - Ebook Factory Architect: attack telemetry with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A23 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

KNOWLEDGE

Load only knowledge required for structured technical books, dense synthesis and publishing QA. Training analysis for A23 - Ebook Factory Architect: knowledge receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OUTPUTS

Emit book package, index and render report, evidence, uncertainty, cost and residual state. Training analysis for A23 - Ebook Factory Architect: outputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

DATA POLICY

Minimize sensitive content and preserve source provenance. Orchestration analysis for A23 - Ebook Factory Architect: data policy links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A23

Trigger	Name the condition that activates A23; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A23 - Ebook Factory Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A23 - Ebook Factory Architect: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A23 through the mission DAG. Orchestration analysis for A23 - Ebook Factory Architect: dispatch links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Training analysis for A23 - Ebook Factory Architect: parallelism receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Orchestration analysis for A23 - Ebook Factory Architect: coordination metrics links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A23 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Failure analysis for A23 - Ebook Factory Architect: attack handoffs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Orchestration analysis for A23 - Ebook Factory Architect: merge links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

CANCELLATION

Stop and return partial artifact plus residual state. Failure analysis for A23 - Ebook Factory Architect: attack cancellation with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A23

Trigger	Name the condition that activates A23; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A23 - Ebook Factory Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A23 - Ebook Factory Architect: Failure, Security and Recovery

PRIMARY RISK

Known risk: filler, citation loss, layout defects. Training analysis for A23 - Ebook Factory Architect: primary risk receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Failure analysis for A23 - Ebook Factory Architect: attack failure verdicts with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Failure analysis for A23 - Ebook Factory Architect: attack independent review with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A23 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Orchestration analysis for A23 - Ebook Factory Architect: attack cases links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Orchestration analysis for A23 - Ebook Factory Architect: recovery links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Training analysis for A23 - Ebook Factory Architect: memory boundary receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A23

Trigger	Name the condition that activates A23; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A23 - Ebook Factory Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A23 - Ebook Factory Architect: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for structured technical books, dense synthesis and publishing QA. Agent contract for A23 - Ebook Factory Architect: training set specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Training analysis for A23 - Ebook Factory Architect: metrics receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Training analysis for A23 - Ebook Factory Architect: promotion receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A23 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Failure analysis for A23 - Ebook Factory Architect: attack baselines with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

ABLATION

Remove A23, reduce tools and change model family. Failure analysis for A23 - Ebook Factory Architect: attack ablation with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Training analysis for A23 - Ebook Factory Architect: evidence status receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A23

Trigger	Name the condition that activates A23; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A23 - Ebook Factory Architect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A24 - Creative Visual Director: Mission and Identity

MISSION

Creative Visual Director is a Media agent focused on abstract geometry, SVG systems and neo-tech visual consistency. Required output: visual system and export set. Failure analysis for A24 - Creative Visual Director: attack mission with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Failure analysis for A24 - Creative Visual Director: attack identity with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Training analysis for A24 - Creative Visual Director: kernel relationship receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A24 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

SCOPE

A24 activates only when specialist value exceeds orchestration cost. Failure analysis for A24 - Creative Visual Director: attack scope with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Orchestration analysis for A24 - Creative Visual Director: authority links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

SUCCESS

Completion requires an accepted artifact and reconciled state. Orchestration analysis for A24 - Creative Visual Director: success links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A24

Trigger	Name the condition that activates A24; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A24 - Creative Visual Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A24 - Creative Visual Director: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Training analysis for A24 - Creative Visual Director: inputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Orchestration analysis for A24 - Creative Visual Director: tools links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Training analysis for A24 - Creative Visual Director: telemetry receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A24 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

KNOWLEDGE

Load only knowledge required for abstract geometry, SVG systems and neo-tech visual consistency. Agent contract for A24 - Creative Visual Director: knowledge specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OUTPUTS

Emit visual system and export set, evidence, uncertainty, cost and residual state. Agent contract for A24 - Creative Visual Director: outputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

DATA POLICY

Minimize sensitive content and preserve source provenance. Failure analysis for A24 - Creative Visual Director: attack data policy with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A24

Trigger	Name the condition that activates A24; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A24 - Creative Visual Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A24 - Creative Visual Director: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A24 through the mission DAG. Failure analysis for A24 - Creative Visual Director: attack dispatch with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Agent contract for A24 - Creative Visual Director: parallelism specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Failure analysis for A24 - Creative Visual Director: attack coordination metrics with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A24 agent يبقى bounded mission executorلا يملك ؛ global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Training analysis for A24 - Creative Visual Director: handoffs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Failure analysis for A24 - Creative Visual Director: attack merge with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

CANCELLATION

Stop and return partial artifact plus residual state. Training analysis for A24 - Creative Visual Director: cancellation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX A24

Trigger	Name the condition that activates A24; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A24 - Creative Visual Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A24 - Creative Visual Director: Failure, Security and Recovery

PRIMARY RISK

Known risk: style over information, accessibility. Agent contract for A24 - Creative Visual Director: primary risk specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Training analysis for A24 - Creative Visual Director: failure verdicts receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Training analysis for A24 - Creative Visual Director: independent review receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A24 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Failure analysis for A24 - Creative Visual Director: attack attack cases with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Failure analysis for A24 - Creative Visual Director: attack recovery with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Agent contract for A24 - Creative Visual Director: memory boundary specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A24

Trigger	Name the condition that activates A24; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A24 - Creative Visual Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A24 - Creative Visual Director: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for abstract geometry, SVG systems and neo-tech visual consistency. Orchestration analysis for A24 - Creative Visual Director: training set links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Agent contract for A24 - Creative Visual Director: metrics specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Agent contract for A24 - Creative Visual Director: promotion specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A24 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Training analysis for A24 - Creative Visual Director: baselines receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

ABLATION

Remove A24, reduce tools and change model family. Training analysis for A24 - Creative Visual Director: ablation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Agent contract for A24 - Creative Visual Director: evidence status specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A24

Trigger	Name the condition that activates A24; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A24 - Creative Visual Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A25 - Viral Hook and Distribution Orchestrator: Mission and Identity

MISSION

Viral Hook and Distribution Orchestrator is a Media agent focused on hook testing, retention analysis and multi-channel distribution. Required output: hook matrix and distribution plan. Failure analysis for A25 - Viral Hook and Distribution Orchestrator: attack mission with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Failure analysis for A25 - Viral Hook and Distribution Orchestrator: attack identity with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Training analysis for A25 - Viral Hook and Distribution Orchestrator: kernel relationship receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A25 agent يبقى bounded mission executorلا يملك ؛ global authority مستقلة.

SCOPE

A25 activates only when specialist value exceeds orchestration cost. Failure analysis for A25 - Viral Hook and Distribution Orchestrator: attack scope with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Orchestration analysis for A25 - Viral Hook and Distribution Orchestrator: authority links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

SUCCESS

Completion requires an accepted artifact and reconciled state. Orchestration analysis for A25 - Viral Hook and Distribution Orchestrator: success links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A25

Trigger	Name the condition that activates A25; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A25 - Viral Hook and Distribution Orchestrator.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A25 - Viral Hook and Distribution Orchestrator: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Training analysis for A25 - Viral Hook and Distribution Orchestrator: inputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Orchestration analysis for A25 - Viral Hook and Distribution Orchestrator: tools links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Training analysis for A25 - Viral Hook and Distribution Orchestrator: telemetry receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A25 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

KNOWLEDGE

Load only knowledge required for hook testing, retention analysis and multi-channel distribution. Agent contract for A25 - Viral Hook and Distribution Orchestrator: knowledge specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OUTPUTS

Emit hook matrix and distribution plan, evidence, uncertainty, cost and residual state. Agent contract for A25 - Viral Hook and Distribution Orchestrator: outputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

DATA POLICY

Minimize sensitive content and preserve source provenance. Failure analysis for A25 - Viral Hook and Distribution Orchestrator: attack data policy with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A25

Trigger	Name the condition that activates A25; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A25 - Viral Hook and Distribution Orchestrator.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A25 - Viral Hook and Distribution Orchestrator: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A25 through the mission DAG. Failure analysis for A25 - Viral Hook and Distribution Orchestrator: attack dispatch with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Agent contract for A25 - Viral Hook and Distribution Orchestrator: parallelism specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Failure analysis for A25 - Viral Hook and Distribution Orchestrator: attack coordination metrics with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A25 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Training analysis for A25 - Viral Hook and Distribution Orchestrator: handoffs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Failure analysis for A25 - Viral Hook and Distribution Orchestrator: attack merge with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

CANCELLATION

Stop and return partial artifact plus residual state. Training analysis for A25 - Viral Hook and Distribution Orchestrator: cancellation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A25

Trigger	Name the condition that activates A25; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A25 - Viral Hook and Distribution Orchestrator.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A25 - Viral Hook and Distribution Orchestrator: Failure, Security and Recovery

PRIMARY RISK

Known risk: spam, short-term optimization. Agent contract for A25 - Viral Hook and Distribution Orchestrator: primary risk specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Training analysis for A25 - Viral Hook and Distribution Orchestrator: failure verdicts receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Training analysis for A25 - Viral Hook and Distribution Orchestrator: independent review receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A25 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Failure analysis for A25 - Viral Hook and Distribution Orchestrator: attack attack cases with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Failure analysis for A25 - Viral Hook and Distribution Orchestrator: attack recovery with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Agent contract for A25 - Viral Hook and Distribution Orchestrator: memory boundary specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A25

Trigger	Name the condition that activates A25; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A25 - Viral Hook and Distribution Orchestrator.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A25 - Viral Hook and Distribution Orchestrator: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for hook testing, retention analysis and multi-channel distribution. Orchestration analysis for A25 - Viral Hook and Distribution Orchestrator: training set links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Agent contract for A25 - Viral Hook and Distribution Orchestrator: metrics specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Agent contract for A25 - Viral Hook and Distribution Orchestrator: promotion specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A25 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Training analysis for A25 - Viral Hook and Distribution Orchestrator: baselines receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

ABLATION

Remove A25, reduce tools and change model family. Training analysis for A25 - Viral Hook and Distribution Orchestrator: ablation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Agent contract for A25 - Viral Hook and Distribution Orchestrator: evidence status specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A25

Trigger	Name the condition that activates A25; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A25 - Viral Hook and Distribution Orchestrator.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A26 - RAG Knowledge Harvester: Mission and Identity

MISSION

RAG Knowledge Harvester is a Knowledge agent focused on ingesting PDF, Markdown, HTML and JSON into the hybrid substrate. Required output: normalized chunks, embeddings and provenance. Training analysis for A26 - RAG Knowledge Harvester: mission receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Training analysis for A26 - RAG Knowledge Harvester: identity receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Agent contract for A26 - RAG Knowledge Harvester: kernel relationship specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A26 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

SCOPE

A26 activates only when specialist value exceeds orchestration cost. Training analysis for A26 - RAG Knowledge Harvester: scope receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Failure analysis for A26 - RAG Knowledge Harvester: attack authority with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

SUCCESS

Completion requires an accepted artifact and reconciled state. Failure analysis for A26 - RAG Knowledge Harvester: attack success with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX A26

Trigger	Name the condition that activates A26; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A26 - RAG Knowledge Harvester.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A26 - RAG Knowledge Harvester: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Agent contract for A26 - RAG Knowledge Harvester: inputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Failure analysis for A26 - RAG Knowledge Harvester: attack tools with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Agent contract for A26 - RAG Knowledge Harvester: telemetry specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A26 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for ingesting PDF, Markdown, HTML and JSON into the hybrid substrate. Orchestration analysis for A26 - RAG Knowledge Harvester: knowledge links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OUTPUTS

Emit normalized chunks, embeddings and provenance, evidence, uncertainty, cost and residual state. Orchestration analysis for A26 - RAG Knowledge Harvester: outputs links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

DATA POLICY

Minimize sensitive content and preserve source provenance. Training analysis for A26 - RAG Knowledge Harvester: data policy receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A26

Trigger	Name the condition that activates A26; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A26 - RAG Knowledge Harvester.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A26 - RAG Knowledge Harvester: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A26 through the mission DAG. Training analysis for A26 - RAG Knowledge Harvester: dispatch receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Orchestration analysis for A26 - RAG Knowledge Harvester: parallelism links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Training analysis for A26 - RAG Knowledge Harvester: coordination metrics receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A26 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Agent contract for A26 - RAG Knowledge Harvester: handoffs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Training analysis for A26 - RAG Knowledge Harvester: merge receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

CANCELLATION

Stop and return partial artifact plus residual state. Agent contract for A26 - RAG Knowledge Harvester: cancellation specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX			A26
Trigger	Name the condition that activates A26; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A26 - RAG Knowledge Harvester.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A26 - RAG Knowledge Harvester: Failure, Security and Recovery

PRIMARY RISK

Known risk: garbage ingestion, duplication. Orchestration analysis for A26 - RAG Knowledge Harvester: primary risk links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Agent contract for A26 - RAG Knowledge Harvester: failure verdicts specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Agent contract for A26 - RAG Knowledge Harvester: independent review specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A26 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Training analysis for A26 - RAG Knowledge Harvester: attack cases receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Training analysis for A26 - RAG Knowledge Harvester: recovery receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Orchestration analysis for A26 - RAG Knowledge Harvester: memory boundary links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A26

Trigger	Name the condition that activates A26; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A26 - RAG Knowledge Harvester.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A26 - RAG Knowledge Harvester: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for ingesting PDF, Markdown, HTML and JSON into the hybrid substrate. Failure analysis for A26 - RAG Knowledge Harvester: attack training set with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Orchestration analysis for A26 - RAG Knowledge Harvester: metrics links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Orchestration analysis for A26 - RAG Knowledge Harvester: promotion links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A26 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Agent contract for A26 - RAG Knowledge Harvester: baselines specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

ABLATION

Remove A26, reduce tools and change model family. Agent contract for A26 - RAG Knowledge Harvester: ablation specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Orchestration analysis for A26 - RAG Knowledge Harvester: evidence status links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A26

Trigger	Name the condition that activates A26; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A26 - RAG Knowledge Harvester.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A27 - Obsidian Brain Bridge: Mission and Identity

MISSION

Obsidian Brain Bridge is a Knowledge agent focused on knowledge graph links, frontmatter and bidirectional continuity. Required output: synchronized graph and conflict report. Agent contract for A27 - Obsidian Brain Bridge: mission specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Agent contract for A27 - Obsidian Brain Bridge: identity specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Orchestration analysis for A27 - Obsidian Brain Bridge: kernel relationship links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A27 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

SCOPE

A27 activates only when specialist value exceeds orchestration cost. Agent contract for A27 - Obsidian Brain Bridge: scope specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Training analysis for A27 - Obsidian Brain Bridge: authority receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

SUCCESS

Completion requires an accepted artifact and reconciled state. Training analysis for A27 - Obsidian Brain Bridge: success receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A27

Trigger	Name the condition that activates A27; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A27 - Obsidian Brain Bridge.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A27 - Obsidian Brain Bridge: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Orchestration analysis for A27 - Obsidian Brain Bridge: inputs links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Training analysis for A27 - Obsidian Brain Bridge: tools receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Orchestration analysis for A27 - Obsidian Brain Bridge: telemetry links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A27 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for knowledge graph links, frontmatter and bidirectional continuity. Failure analysis for A27 - Obsidian Brain Bridge: attack knowledge with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OUTPUTS

Emit synchronized graph and conflict report, evidence, uncertainty, cost and residual state. Failure analysis for A27 - Obsidian Brain Bridge: attack outputs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

DATA POLICY

Minimize sensitive content and preserve source provenance. Agent contract for A27 - Obsidian Brain Bridge: data policy specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A27

Trigger	Name the condition that activates A27; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A27 - Obsidian Brain Bridge.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A27 - Obsidian Brain Bridge: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A27 through the mission DAG. Agent contract for A27 - Obsidian Brain Bridge: dispatch specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Failure analysis for A27 - Obsidian Brain Bridge: attack parallelism with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Agent contract for A27 - Obsidian Brain Bridge: coordination metrics specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A27 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Orchestration analysis for A27 - Obsidian Brain Bridge: handoffs links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Agent contract for A27 - Obsidian Brain Bridge: merge specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

CANCELLATION

Stop and return partial artifact plus residual state. Orchestration analysis for A27 - Obsidian Brain Bridge: cancellation links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A27

Trigger	Name the condition that activates A27; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A27 - Obsidian Brain Bridge.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A27 - Obsidian Brain Bridge: Failure, Security and Recovery

PRIMARY RISK

Known risk: link rot, source-of-truth conflict. Failure analysis for A27 - Obsidian Brain Bridge: attack primary risk with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Orchestration analysis for A27 - Obsidian Brain Bridge: failure verdicts links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Orchestration analysis for A27 - Obsidian Brain Bridge: independent review links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A27 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Agent contract for A27 - Obsidian Brain Bridge: attack cases specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Agent contract for A27 - Obsidian Brain Bridge: recovery specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Failure analysis for A27 - Obsidian Brain Bridge: attack memory boundary with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A27

Trigger	Name the condition that activates A27; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A27 - Obsidian Brain Bridge.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A27 - Obsidian Brain Bridge: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for knowledge graph links, frontmatter and bidirectional continuity. Training analysis for A27 - Obsidian Brain Bridge: training set receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Failure analysis for A27 - Obsidian Brain Bridge: attack metrics with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Failure analysis for A27 - Obsidian Brain Bridge: attack promotion with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A27 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Orchestration analysis for A27 - Obsidian Brain Bridge: baselines links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

ABLATION

Remove A27, reduce tools and change model family. Orchestration analysis for A27 - Obsidian Brain Bridge: ablation links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Failure analysis for A27 - Obsidian Brain Bridge: attack evidence status with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A27

Trigger	Name the condition that activates A27; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A27 - Obsidian Brain Bridge.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A28 - Skill Creator and Compiler: Mission and Identity

MISSION

Skill Creator and Compiler is a Knowledge agent focused on compiling validated traces into atomic reusable skill contracts. Required output: SKILL artifact, tests and registry entry. Agent contract for A28 - Skill Creator and Compiler: mission specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Agent contract for A28 - Skill Creator and Compiler: identity specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Orchestration analysis for A28 - Skill Creator and Compiler: kernel relationship links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A28 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A28 activates only when specialist value exceeds orchestration cost. Agent contract for A28 - Skill Creator and Compiler: scope specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Training analysis for A28 - Skill Creator and Compiler: authority receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

SUCCESS

Completion requires an accepted artifact and reconciled state. Training analysis for A28 - Skill Creator and Compiler: success receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A28

Trigger	Name the condition that activates A28; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A28 - Skill Creator and Compiler.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A28 - Skill Creator and Compiler: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Orchestration analysis for A28 - Skill Creator and Compiler: inputs links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Training analysis for A28 - Skill Creator and Compiler: tools receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Orchestration analysis for A28 - Skill Creator and Compiler: telemetry links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A28 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for compiling validated traces into atomic reusable skill contracts. Failure analysis for A28 - Skill Creator and Compiler: attack knowledge with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OUTPUTS

Emit SKILL artifact, tests and registry entry, evidence, uncertainty, cost and residual state. Failure analysis for A28 - Skill Creator and Compiler: attack outputs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

DATA POLICY

Minimize sensitive content and preserve source provenance. Agent contract for A28 - Skill Creator and Compiler: data policy specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A28

Trigger	Name the condition that activates A28; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A28 - Skill Creator and Compiler.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A28 - Skill Creator and Compiler: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A28 through the mission DAG. Agent contract for A28 - Skill Creator and Compiler: dispatch specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Failure analysis for A28 - Skill Creator and Compiler: attack parallelism with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Agent contract for A28 - Skill Creator and Compiler: coordination metrics specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A28 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Orchestration analysis for A28 - Skill Creator and Compiler: handoffs links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Agent contract for A28 - Skill Creator and Compiler: merge specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

CANCELLATION

Stop and return partial artifact plus residual state. Orchestration analysis for A28 - Skill Creator and Compiler: cancellation links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A28

Trigger	Name the condition that activates A28; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A28 - Skill Creator and Compiler.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A28 - Skill Creator and Compiler: Failure, Security and Recovery

PRIMARY RISK

Known risk: skill bloat, false generalization. Failure analysis for A28 - Skill Creator and Compiler: attack primary risk with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Orchestration analysis for A28 - Skill Creator and Compiler: failure verdicts links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Orchestration analysis for A28 - Skill Creator and Compiler: independent review links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A28 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Agent contract for A28 - Skill Creator and Compiler: attack cases specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Agent contract for A28 - Skill Creator and Compiler: recovery specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Failure analysis for A28 - Skill Creator and Compiler: attack memory boundary with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A28

Trigger	Name the condition that activates A28; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A28 - Skill Creator and Compiler.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A28 - Skill Creator and Compiler: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for compiling validated traces into atomic reusable skill contracts. Training analysis for A28 - Skill Creator and Compiler: training set receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Failure analysis for A28 - Skill Creator and Compiler: attack metrics with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Failure analysis for A28 - Skill Creator and Compiler: attack promotion with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A28 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Orchestration analysis for A28 - Skill Creator and Compiler: baselines links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

ABLATION

Remove A28, reduce tools and change model family. Orchestration analysis for A28 - Skill Creator and Compiler: ablation links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Failure analysis for A28 - Skill Creator and Compiler: attack evidence status with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A28

Trigger	Name the condition that activates A28; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A28 - Skill Creator and Compiler.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A29 - Telemetry and Observability Director: Mission and Identity

MISSION

Telemetry and Observability Director is a Knowledge agent focused on execution metrics, token cost, latency, drift and cockpit signals. Required output: telemetry ledger and actionable alerts. Orchestration analysis for A29 - Telemetry and Observability Director: mission links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Orchestration analysis for A29 - Telemetry and Observability Director: identity links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Failure analysis for A29 - Telemetry and Observability Director: attack kernel relationship with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A29 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A29 activates only when specialist value exceeds orchestration cost. Orchestration analysis for A29 - Telemetry and Observability Director: scope links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Agent contract for A29 - Telemetry and Observability Director: authority specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

SUCCESS

Completion requires an accepted artifact and reconciled state. Agent contract for A29 - Telemetry and Observability Director: success specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A29

Trigger	Name the condition that activates A29; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A29 - Telemetry and Observability Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A29 - Telemetry and Observability Director: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Failure analysis for A29 - Telemetry and Observability Director: attack inputs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Agent contract for A29 - Telemetry and Observability Director: tools specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Failure analysis for A29 - Telemetry and Observability Director: attack telemetry with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A29 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

KNOWLEDGE

Load only knowledge required for execution metrics, token cost, latency, drift and cockpit signals. Training analysis for A29 - Telemetry and Observability Director: knowledge receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OUTPUTS

Emit telemetry ledger and actionable alerts, evidence, uncertainty, cost and residual state. Training analysis for A29 - Telemetry and Observability Director: outputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

DATA POLICY

Minimize sensitive content and preserve source provenance. Orchestration analysis for A29 - Telemetry and Observability Director: data policy links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX — A29

Trigger	Name the condition that activates A29; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A29 - Telemetry and Observability Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A29 - Telemetry and Observability Director: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A29 through the mission DAG. Orchestration analysis for A29 - Telemetry and Observability Director: dispatch links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Training analysis for A29 - Telemetry and Observability Director: parallelism receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Orchestration analysis for A29 - Telemetry and Observability Director: coordination metrics links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

A29 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Failure analysis for A29 - Telemetry and Observability Director: attack handoffs with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Orchestration analysis for A29 - Telemetry and Observability Director: merge links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

CANCELLATION

Stop and return partial artifact plus residual state. Failure analysis for A29 - Telemetry and Observability Director: attack cancellation with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A29

Trigger	Name the condition that activates A29; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A29 - Telemetry and Observability Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A29 - Telemetry and Observability Director: Failure, Security and Recovery

PRIMARY RISK

Known risk: sensitive logging, alert fatigue. Training analysis for A29 - Telemetry and Observability Director: primary risk receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Failure analysis for A29 - Telemetry and Observability Director: attack failure verdicts with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Failure analysis for A29 - Telemetry and Observability Director: attack independent review with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A29 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Orchestration analysis for A29 - Telemetry and Observability Director: attack cases links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Orchestration analysis for A29 - Telemetry and Observability Director: recovery links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Training analysis for A29 - Telemetry and Observability Director: memory boundary receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A29

Trigger	Name the condition that activates A29; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A29 - Telemetry and Observability Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A29 - Telemetry and Observability Director: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for execution metrics, token cost, latency, drift and cockpit signals. Agent contract for A29 - Telemetry and Observability Director: training set specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Training analysis for A29 - Telemetry and Observability Director: metrics receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Training analysis for A29 - Telemetry and Observability Director: promotion receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A29 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Failure analysis for A29 - Telemetry and Observability Director: attack baselines with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

ABLATION

Remove A29, reduce tools and change model family. Failure analysis for A29 - Telemetry and Observability Director: attack ablation with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Training analysis for A29 - Telemetry and Observability Director: evidence status receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A29

Trigger	Name the condition that activates A29; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A29 - Telemetry and Observability Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A30 - Ecosystem Executive Director: Mission and Identity

MISSION

Ecosystem Executive Director is a Knowledge agent focused on cross-agent alignment, resource allocation, versions and roadmap. Required output: ecosystem state, priorities and release decision. Failure analysis for A30 - Ecosystem Executive Director: attack mission with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

IDENTITY

Declarative agent identity includes version, tier, capabilities and constitutional boundary. Failure analysis for A30 - Ecosystem Executive Director: attack identity with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

KERNEL RELATIONSHIP

The agent consumes kernel services; it is not itself the kernel. Training analysis for A30 - Ecosystem Executive Director: kernel relationship receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A30 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

SCOPE

A30 activates only when specialist value exceeds orchestration cost. Failure analysis for A30 - Ecosystem Executive Director: attack scope with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

AUTHORITY

Tools and mutations are limited by T0-T4 and the mission contract. Orchestration analysis for A30 - Ecosystem Executive Director: authority links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

SUCCESS

Completion requires an accepted artifact and reconciled state. Orchestration analysis for A30 - Ecosystem Executive Director: success links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

OPERATIONAL EVIDENCE MATRIX

A30

Trigger	Name the condition that activates A30; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A30 - Ecosystem Executive Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A30 - Ecosystem Executive Director: Inputs, Outputs and Tools

INPUTS

Goal contract, context capsule, evidence pointers, authority, tools and budget. Training analysis for A30 - Ecosystem Executive Director: inputs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

TOOLS

Each tool call has typed input, precondition, postcondition and rollback. Orchestration analysis for A30 - Ecosystem Executive Director: tools links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

TELEMETRY

Record route, latency, tokens, tools, court verdict and memory write. Training analysis for A30 - Ecosystem Executive Director: telemetry receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A30 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

KNOWLEDGE

Load only knowledge required for cross-agent alignment, resource allocation, versions and roadmap. Agent contract for A30 - Ecosystem Executive Director: knowledge specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OUTPUTS

Emit ecosystem state, priorities and release decision, evidence, uncertainty, cost and residual state. Agent contract for A30 - Ecosystem Executive Director: outputs specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

DATA POLICY

Minimize sensitive content and preserve source provenance. Failure analysis for A30 - Ecosystem Executive Director: attack data policy with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

OPERATIONAL EVIDENCE MATRIX

A30

Trigger	Name the condition that activates A30; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A30 - Ecosystem Executive Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A30 - Ecosystem Executive Director: Orchestration and Handoffs

DISPATCH

A01 or an authorized planner dispatches A30 through the mission DAG. Failure analysis for A30 - Ecosystem Executive Director: attack dispatch with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

PARALLELISM

Run parallel only when tasks are independent or merge rules are explicit. Agent contract for A30 - Ecosystem Executive Director: parallelism specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

COORDINATION METRICS

Measure wait, duplicate work, conflict, merge defect and speedup. Failure analysis for A30 - Ecosystem Executive Director: attack coordination metrics with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

A30 agent يبقى bounded mission executor لا يملك ؛ global authority مستقلة.

HANDOFFS

Context capsules preserve goal, state, evidence and unresolved items. Training analysis for A30 - Ecosystem Executive Director: handoffs receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

MERGE

An arbiter resolves conflicts using evidence and acceptance tests. Failure analysis for A30 - Ecosystem Executive Director: attack merge with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

CANCELLATION

Stop and return partial artifact plus residual state. Training analysis for A30 - Ecosystem Executive Director: cancellation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

OPERATIONAL EVIDENCE MATRIX

A30

Trigger	Name the condition that activates A30; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A30 - Ecosystem Executive Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A30 - Ecosystem Executive Director: Failure, Security and Recovery

PRIMARY RISK

Known risk: centralized bias, portfolio overreach. Agent contract for A30 - Ecosystem Executive Director: primary risk specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

FAILURE VERDICTS

RETRY-WITH-CHANGE, DEGRADE, HUMAN-REVIEW, ROLLBACK or STOP. Training analysis for A30 - Ecosystem Executive Director: failure verdicts receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

INDEPENDENT REVIEW

High-risk outputs use A12 or another independent verifier. Training analysis for A30 - Ecosystem Executive Director: independent review receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

A30 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

ATTACK CASES

Conflicting prompt, stale context, injection, unavailable tool, timeout and revoked authority. Failure analysis for A30 - Ecosystem Executive Director: attack attack cases with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

RECOVERY

Preserve pre-state and mission trace; never hide partial mutation. Failure analysis for A30 - Ecosystem Executive Director: attack recovery with incomplete context, conflicting instructions, stale knowledge, unavailable tools, revoked authority, timeout, partial mutation and malicious retrieved content. The agent reports residual state and never declares success from intent. Independent verification is required when the same model family or prompt produced the artifact.

MEMORY BOUNDARY

Only validated, useful and scoped results enter durable memory. Agent contract for A30 - Ecosystem Executive Director: memory boundary specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A30

Trigger	Name the condition that activates A30; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A30 - Ecosystem Executive Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

A30 - Ecosystem Executive Director: Training, Benchmarks and Promotion

TRAINING SET

Positive, negative, edge, adversarial and transfer missions for cross-agent alignment, resource allocation, versions and roadmap. Orchestration analysis for A30 - Ecosystem Executive Director: training set links to the mission DAG through typed dispatch and handoff capsules. Compare serial, parallel and no-agent baselines. Measure coordination loss, duplicate work, merge conflicts, waiting time and recovery. A specialist is justified only when domain value exceeds communication and governance overhead. Shared assumptions remain in the task ledger rather than private agent memory.

METRICS

Artifact quality, policy adherence, cost, latency, calibration and world effect. Agent contract for A30 - Ecosystem Executive Director: metrics specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

PROMOTION

Require replay, security, recovery, transfer and owner sign-off. Agent contract for A30 - Ecosystem Executive Director: promotion specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

A30 agent يبقى bounded mission executor؛ لا يملك global authority مستقلة.

BASELINES

No-agent, generalist-agent and rule-based specialist baselines. Training analysis for A30 - Ecosystem Executive Director: baselines receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

ABLATION

Remove A30, reduce tools and change model family. Training analysis for A30 - Ecosystem Executive Director: ablation receives positive, negative, edge, adversarial and transfer missions. Evaluation freezes model and environment fingerprints, tool versions and budgets. Promotion requires schema-valid outputs, policy adherence, useful world effect, calibration, replay and rollback. Application agents do not enlarge the cognitive kernel unless they expose a reusable mechanism.

EVIDENCE STATUS

Agent count or JSON declaration is not evidence of production readiness. Agent contract for A30 - Ecosystem Executive Director: evidence status specifies mission ID, goal contract, scope, authority tier, knowledge capsule, allowed tools, output schema, budget, deadline, handoff target and acceptance test. The agent cannot silently broaden scope or infer permission. Progress is measured by validated artifact state, not message volume. Cancellation and partial completion are explicit outcomes.

OPERATIONAL EVIDENCE MATRIX

A30

Trigger	Name the condition that activates A30; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by A30 - Ecosystem Executive Director.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S01 - xt-api: Purpose and API Contract

SERVICE PURPOSE

xt-api owns public and internal API boundary, request normalization and version negotiation. Canonical output: request envelope and API response. Security analysis for S01 - xt-api: service purpose uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Security analysis for S01 - xt-api: ownership uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

SLOS

Measure availability, schema validity, latency, availability and tail latency. Service contract for S01 - xt-api: slos defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-api يحتاج source of truth وSLO وfailure path اعتباره قبل production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Deployment analysis for S01 - xt-api: api contract has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Security analysis for S01 - xt-api: dependencies uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Deployment analysis for S01 - xt-api: boundary has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX

S01

Trigger	Name the condition that activates S01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S01 - xt-api.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S01 - xt-api: State, Data and Consistency

STATE MODEL

xt-api distinguishes durable state, cache, derived views and telemetry. Service contract for S01 - xt-api: state model defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Deployment analysis for S01 - xt-api: persistence has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. State and reliability analysis for S01 - xt-api: failure injection distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

xt-api يحتاج source of truth وSLO وfailure path اعتباره قبل production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. Service contract for S01 - xt-api: consistency defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RECONCILIATION

Verify returned state before accepting request envelope and API response. State and reliability analysis for S01 - xt-api: reconciliation distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RECOVERY

Restore semantic correctness, not process uptime alone. State and reliability analysis for S01 - xt-api: recovery distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX

S01

Trigger	Name the condition that activates S01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S01 - xt-api.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S01 - xt-api: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Security analysis for S01 - xt-api: identity uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

SECRETS

Reference, rotate and audit secrets without logging values. State and reliability analysis for S01 - xt-api: secrets distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

AUDIT

Link request, policy, mutation, postcondition and release version. Deployment analysis for S01 - xt-api: audit has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. State and reliability analysis for S01 - xt-api: incident response distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

xt-api يحتاج source of truth وSLO وfailure path اعتباره قبل production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Security analysis for S01 - xt-api: input defense uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OBSERVABILITY

Traces, metrics and logs cover availability, schema validity, latency and downstream failure. Deployment analysis for S01 - xt-api: observability has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX

S01

Trigger	Name the condition that activates S01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S01 - xt-api.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S01 - xt-api: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-api schemas, properties and compatibility. Security analysis for S01 - xt-api: unit and contract tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

LOAD TESTS

Measure availability, schema validity, latency, saturation, queues and backpressure. State and reliability analysis for S01 - xt-api: load tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

ROLLBACK

Rehearse application and data rollback; report residual state. Service contract for S01 - xt-api: rollback defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-api يحتاج source of truth وSLO وfailure path اعتباره قبل production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. State and reliability analysis for S01 - xt-api: integration tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

CANARY

Promote a small cohort with comparison and rollback threshold. Service contract for S01 - xt-api: canary defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. Service contract for S01 - xt-api: release verdict defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX S01

Trigger	Name the condition that activates S01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S01 - xt-api.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S02 - xt-identity: Purpose and API Contract

SERVICE PURPOSE

xt-identity owns runtime identity, tenant, session and constitutional context. Canonical output: identity and session manifest. Deployment analysis for S02 - xt-identity: service purpose has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Deployment analysis for S02 - xt-identity: ownership has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SLOS

Measure identity integrity, session isolation, availability and tail latency. State and reliability analysis for S02 - xt-identity: slos distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

xt-identity يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Service contract for S02 - xt-identity: api contract defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Deployment analysis for S02 - xt-identity: dependencies has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Service contract for S02 - xt-identity: boundary defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S02

Trigger	Name the condition that activates S02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S02 - xt-identity.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S02 - xt-identity: State, Data and Consistency

STATE MODEL

xt-identity distinguishes durable state, cache, derived views and telemetry. State and reliability analysis for S02 - xt-identity: state model distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Service contract for S02 - xt-identity: persistence defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Security analysis for S02 - xt-identity: failure injection uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

xt-identity يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. State and reliability analysis for S02 - xt-identity: consistency distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RECONCILIATION

Verify returned state before accepting identity and session manifest. Security analysis for S02 - xt-identity: reconciliation uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

RECOVERY

Restore semantic correctness, not process uptime alone. Security analysis for S02 - xt-identity: recovery uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S02

Trigger	Name the condition that activates S02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S02 - xt-identity.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S02 - xt-identity: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Deployment analysis for S02 - xt-identity: identity has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SECRETS

Reference, rotate and audit secrets without logging values. Security analysis for S02 - xt-identity: secrets uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

AUDIT

Link request, policy, mutation, postcondition and release version. Service contract for S02 - xt-identity: audit defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-identity يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Deployment analysis for S02 - xt-identity: input defense has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OBSERVABILITY

Traces, metrics and logs cover identity integrity, session isolation and downstream failure. Service contract for S02 - xt-identity: observability defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Security analysis for S02 - xt-identity: incident response uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S02

Trigger	Name the condition that activates S02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S02 - xt-identity.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S02 - xt-identity: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-identity schemas, properties and compatibility. Deployment analysis for S02 - xt-identity: unit and contract tests has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

LOAD TESTS

Measure identity integrity, session isolation, saturation, queues and backpressure. Security analysis for S02 - xt-identity: load tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

ROLLBACK

Rehearse application and data rollback; report residual state. State and reliability analysis for S02 - xt-identity: rollback distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

xt-identity يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Security analysis for S02 - xt-identity: integration tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

CANARY

Promote a small cohort with comparison and rollback threshold. State and reliability analysis for S02 - xt-identity: canary distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. State and reliability analysis for S02 - xt-identity: release verdict distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX S02

Trigger	Name the condition that activates S02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S02 - xt-identity.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S03 - xt-goal-service: Purpose and API Contract

SERVICE PURPOSE

xt-goal-service owns goal contracts, governing questions and acceptance tests. Canonical output: goal contract. Deployment analysis for S03 - xt-goal-service: service purpose has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Deployment analysis for S03 - xt-goal-service: ownership has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SLOS

Measure scope stability, acceptance pass, availability and tail latency. State and reliability analysis for S03 - xt-goal-service: slos distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

xt-goal-service يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Service contract for S03 - xt-goal-service: api contract defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Deployment analysis for S03 - xt-goal-service: dependencies has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Service contract for S03 - xt-goal-service: boundary defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S03

Trigger	Name the condition that activates S03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S03 - xt-goal-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S03 - xt-goal-service: State, Data and Consistency

STATE MODEL

xt-goal-service distinguishes durable state, cache, derived views and telemetry. State and reliability analysis for S03 - xt-goal-service: state model distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Service contract for S03 - xt-goal-service: persistence defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Security analysis for S03 - xt-goal-service: failure injection uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

xt-goal-service يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. State and reliability analysis for S03 - xt-goal-service: consistency distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RECONCILIATION

Verify returned state before accepting goal contract. Security analysis for S03 - xt-goal-service: reconciliation uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

RECOVERY

Restore semantic correctness, not process uptime alone. Security analysis for S03 - xt-goal-service: recovery uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S03

Trigger	Name the condition that activates S03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S03 - xt-goal-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S03 - xt-goal-service: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Deployment analysis for S03 - xt-goal-service: identity has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SECRETS

Reference, rotate and audit secrets without logging values. Security analysis for S03 - xt-goal-service: secrets uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

AUDIT

Link request, policy, mutation, postcondition and release version. Service contract for S03 - xt-goal-service: audit defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-goal-service يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Deployment analysis for S03 - xt-goal-service: input defense has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OBSERVABILITY

Traces, metrics and logs cover scope stability, acceptance pass and downstream failure. Service contract for S03 - xt-goal-service: observability defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Security analysis for S03 - xt-goal-service: incident response uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S03

Trigger	Name the condition that activates S03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S03 - xt-goal-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S03 - xt-goal-service: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-goal-service schemas, properties and compatibility. Deployment analysis for S03 - xt-goal-service: unit and contract tests has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

LOAD TESTS

Measure scope stability, acceptance pass, saturation, queues and backpressure. Security analysis for S03 - xt-goal-service: load tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

ROLLBACK

Rehearse application and data rollback; report residual state. State and reliability analysis for S03 - xt-goal-service: rollback distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

xt-goal-service يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Security analysis for S03 - xt-goal-service: integration tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

CANARY

Promote a small cohort with comparison and rollback threshold. State and reliability analysis for S03 - xt-goal-service: canary distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. State and reliability analysis for S03 - xt-goal-service: release verdict distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX			S03
Trigger	Name the condition that activates S03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S03 - xt-goal-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S04 - xt-context-engine: Purpose and API Contract

SERVICE PURPOSE

xt-context-engine owns context genomes, capsules, compaction and paging. Canonical output: context package. Deployment analysis for S04 - xt-context-engine: service purpose has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Deployment analysis for S04 - xt-context-engine: ownership has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SLOS

Measure fidelity, freshness, token economy, availability and tail latency. State and reliability analysis for S04 - xt-context-engine: slos distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-context-engine production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Service contract for S04 - xt-context-engine: api contract defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Deployment analysis for S04 - xt-context-engine: dependencies has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Service contract for S04 - xt-context-engine: boundary defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S04

Trigger	Name the condition that activates S04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S04 - xt-context-engine.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S04 - xt-context-engine: State, Data and Consistency

STATE MODEL

xt-context-engine distinguishes durable state, cache, derived views and telemetry. State and reliability analysis for S04 - xt-context-engine: state model distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Service contract for S04 - xt-context-engine: persistence defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Security analysis for S04 - xt-context-engine: failure injection uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

قبل اعتباره xt-context-engine يحتاج source of truth وSLO وfailure path production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. State and reliability analysis for S04 - xt-context-engine: consistency distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RECONCILIATION

Verify returned state before accepting context package. Security analysis for S04 - xt-context-engine: reconciliation uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

RECOVERY

Restore semantic correctness, not process uptime alone. Security analysis for S04 - xt-context-engine: recovery uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S04

Trigger	Name the condition that activates S04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S04 - xt-context-engine.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S04 - xt-context-engine: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Deployment analysis for S04 - xt-context-engine: identity has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SECRETS

Reference, rotate and audit secrets without logging values. Security analysis for S04 - xt-context-engine: secrets uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

AUDIT

Link request, policy, mutation, postcondition and release version. Service contract for S04 - xt-context-engine: audit defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-context-engine production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Deployment analysis for S04 - xt-context-engine: input defense has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OBSERVABILITY

Traces, metrics and logs cover fidelity, freshness, token economy and downstream failure. Service contract for S04 - xt-context-engine: observability defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Security analysis for S04 - xt-context-engine: incident response uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S04

Trigger	Name the condition that activates S04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S04 - xt-context-engine.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S04 - xt-context-engine: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-context-engine schemas, properties and compatibility. Deployment analysis for S04 - xt-context-engine: unit and contract tests has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

LOAD TESTS

Measure fidelity, freshness, token economy, saturation, queues and backpressure. Security analysis for S04 - xt-context-engine: load tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

ROLLBACK

Rehearse application and data rollback; report residual state. State and reliability analysis for S04 - xt-context-engine: rollback distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-context-engine production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Security analysis for S04 - xt-context-engine: integration tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

CANARY

Promote a small cohort with comparison and rollback threshold. State and reliability analysis for S04 - xt-context-engine: canary distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. State and reliability analysis for S04 - xt-context-engine: release verdict distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX			S04
Trigger	Name the condition that activates S04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S04 - xt-context-engine.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S05 - xt-mcd-service: Purpose and API Contract

SERVICE PURPOSE

xt-mcd-service owns active-difference extraction and causal ranking. Canonical output: MCD scorecard. Security analysis for S05 - xt-mcd-service: service purpose uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Security analysis for S05 - xt-mcd-service: ownership uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

SLOS

Measure decision impact, ranking stability, availability and tail latency. Service contract for S05 - xt-mcd-service: slos defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-mcd-service يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Deployment analysis for S05 - xt-mcd-service: api contract has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Security analysis for S05 - xt-mcd-service: dependencies uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Deployment analysis for S05 - xt-mcd-service: boundary has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX

S05

Trigger	Name the condition that activates S05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S05 - xt-mcd-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S05 - xt-mcd-service: State, Data and Consistency

STATE MODEL

xt-mcd-service distinguishes durable state, cache, derived views and telemetry. Service contract for S05 - xt-mcd-service: state model defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Deployment analysis for S05 - xt-mcd-service: persistence has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. State and reliability analysis for S05 - xt-mcd-service: failure injection distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

xt-mcd-service يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. Service contract for S05 - xt-mcd-service: consistency defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RECONCILIATION

Verify returned state before accepting MCD scorecard. State and reliability analysis for S05 - xt-mcd-service: reconciliation distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RECOVERY

Restore semantic correctness, not process uptime alone. State and reliability analysis for S05 - xt-mcd-service: recovery distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX

S05

Trigger	Name the condition that activates S05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S05 - xt-mcd-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S05 - xt-mcd-service: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Security analysis for S05 - xt-mcd-service: identity uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

SECRETS

Reference, rotate and audit secrets without logging values. State and reliability analysis for S05 - xt-mcd-service: secrets distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

AUDIT

Link request, policy, mutation, postcondition and release version. Deployment analysis for S05 - xt-mcd-service: audit has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

xt-mcd-service يحتاج source of truth وSLO وfailure path اعتباره قبل production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Security analysis for S05 - xt-mcd-service: input defense uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OBSERVABILITY

Traces, metrics and logs cover decision impact, ranking stability and downstream failure. Deployment analysis for S05 - xt-mcd-service: observability has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. State and reliability analysis for S05 - xt-mcd-service: incident response distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX

S05

Trigger	Name the condition that activates S05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S05 - xt-mcd-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S05 - xt-mcd-service: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-mcd-service schemas, properties and compatibility. Security analysis for S05 - xt-mcd-service: unit and contract tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

LOAD TESTS

Measure decision impact, ranking stability, saturation, queues and backpressure. State and reliability analysis for S05 - xt-mcd-service: load tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

ROLLBACK

Rehearse application and data rollback; report residual state. Service contract for S05 - xt-mcd-service: rollback defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-mcd-service يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. State and reliability analysis for S05 - xt-mcd-service: integration tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

CANARY

Promote a small cohort with comparison and rollback threshold. Service contract for S05 - xt-mcd-service: canary defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. Service contract for S05 - xt-mcd-service: release verdict defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX S05

Trigger	Name the condition that activates S05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S05 - xt-mcd-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S06 - xt-router: Purpose and API Contract

SERVICE PURPOSE

xt-router owns sparse routing across models, skills, agents and tools. Canonical output: route packet. Security analysis for S06 - xt-router: service purpose uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Security analysis for S06 - xt-router: ownership uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

SLOS

Measure quality per cost, route sparsity, availability and tail latency. Service contract for S06 - xt-router: slos defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-router يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Deployment analysis for S06 - xt-router: api contract has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Security analysis for S06 - xt-router: dependencies uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Deployment analysis for S06 - xt-router: boundary has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX

S06

Trigger	Name the condition that activates S06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S06 - xt-router.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S06 - xt-router: State, Data and Consistency

STATE MODEL

xt-router distinguishes durable state, cache, derived views and telemetry. Service contract for S06 - xt-router: state model defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Deployment analysis for S06 - xt-router: persistence has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. State and reliability analysis for S06 - xt-router: failure injection distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

xt-router يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. Service contract for S06 - xt-router: consistency defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RECONCILIATION

Verify returned state before accepting route packet. State and reliability analysis for S06 - xt-router: reconciliation distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RECOVERY

Restore semantic correctness, not process uptime alone. State and reliability analysis for S06 - xt-router: recovery distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX

S06

Trigger	Name the condition that activates S06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S06 - xt-router.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S06 - xt-router: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Security analysis for S06 - xt-router: identity uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

SECRETS

Reference, rotate and audit secrets without logging values. State and reliability analysis for S06 - xt-router: secrets distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

AUDIT

Link request, policy, mutation, postcondition and release version. Deployment analysis for S06 - xt-router: audit has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

xt-router يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Security analysis for S06 - xt-router: input defense uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OBSERVABILITY

Traces, metrics and logs cover quality per cost, route sparsity and downstream failure. Deployment analysis for S06 - xt-router: observability has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. State and reliability analysis for S06 - xt-router: incident response distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX

S06

Trigger	Name the condition that activates S06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S06 - xt-router.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S06 - xt-router: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-router schemas, properties and compatibility. Security analysis for S06 - xt-router: unit and contract tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

LOAD TESTS

Measure quality per cost, route sparsity, saturation, queues and backpressure. State and reliability analysis for S06 - xt-router: load tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

ROLLBACK

Rehearse application and data rollback; report residual state. Service contract for S06 - xt-router: rollback defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-router يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. State and reliability analysis for S06 - xt-router: integration tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

CANARY

Promote a small cohort with comparison and rollback threshold. Service contract for S06 - xt-router: canary defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. Service contract for S06 - xt-router: release verdict defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX S06

Trigger	Name the condition that activates S06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S06 - xt-router.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S07 - xt-planner: Purpose and API Contract

SERVICE PURPOSE

xt-planner owns temporal mission DAGs, dependencies, checkpoints and rollback. Canonical output: plan graph. Security analysis for S07 - xt-planner: service purpose uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Security analysis for S07 - xt-planner: ownership uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

SLOS

Measure critical path, replan rate, availability and tail latency. Service contract for S07 - xt-planner: slos defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-planner يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Deployment analysis for S07 - xt-planner: api contract has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Security analysis for S07 - xt-planner: dependencies uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Deployment analysis for S07 - xt-planner: boundary has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX

S07

Trigger	Name the condition that activates S07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S07 - xt-planner.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S07 - xt-planner: State, Data and Consistency

STATE MODEL

xt-planner distinguishes durable state, cache, derived views and telemetry. Service contract for S07 - xt-planner: state model defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Deployment analysis for S07 - xt-planner: persistence has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. State and reliability analysis for S07 - xt-planner: failure injection distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

xt-planner يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. Service contract for S07 - xt-planner: consistency defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RECONCILIATION

Verify returned state before accepting plan graph. State and reliability analysis for S07 - xt-planner: reconciliation distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RECOVERY

Restore semantic correctness, not process uptime alone. State and reliability analysis for S07 - xt-planner: recovery distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX

S07

Trigger	Name the condition that activates S07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S07 - xt-planner.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S07 - xt-planner: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Security analysis for S07 - xt-planner: identity uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

SECRETS

Reference, rotate and audit secrets without logging values. State and reliability analysis for S07 - xt-planner: secrets distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

AUDIT

Link request, policy, mutation, postcondition and release version. Deployment analysis for S07 - xt-planner: audit has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

xt-planner يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Security analysis for S07 - xt-planner: input defense uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OBSERVABILITY

Traces, metrics and logs cover critical path, replan rate and downstream failure. Deployment analysis for S07 - xt-planner: observability has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. State and reliability analysis for S07 - xt-planner: incident response distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX

S07

Trigger	Name the condition that activates S07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S07 - xt-planner.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S07 - xt-planner: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-planner schemas, properties and compatibility. Security analysis for S07 - xt-planner: unit and contract tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

LOAD TESTS

Measure critical path, replan rate, saturation, queues and backpressure. State and reliability analysis for S07 - xt-planner: load tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

ROLLBACK

Rehearse application and data rollback; report residual state. Service contract for S07 - xt-planner: rollback defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-planner يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. State and reliability analysis for S07 - xt-planner: integration tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

CANARY

Promote a small cohort with comparison and rollback threshold. Service contract for S07 - xt-planner: canary defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. Service contract for S07 - xt-planner: release verdict defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX S07

Trigger	Name the condition that activates S07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S07 - xt-planner.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S08 - xt-model-gateway: Purpose and API Contract

SERVICE PURPOSE

xt-model-gateway owns provider-neutral inference, capability profiles and fallbacks. Canonical output: model response with route metadata. Deployment analysis for S08 - xt-model-gateway: service purpose has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Deployment analysis for S08 - xt-model-gateway: ownership has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SLOS

Measure quality, failover, privacy, cost, availability and tail latency. State and reliability analysis for S08 - xt-model-gateway: slos distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-model-gateway production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Service contract for S08 - xt-model-gateway: api contract defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Deployment analysis for S08 - xt-model-gateway: dependencies has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Service contract for S08 - xt-model-gateway: boundary defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S08

Trigger	Name the condition that activates S08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S08 - xt-model-gateway.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S08 - xt-model-gateway: State, Data and Consistency

STATE MODEL

xt-model-gateway distinguishes durable state, cache, derived views and telemetry. State and reliability analysis for S08 - xt-model-gateway: state model distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Service contract for S08 - xt-model-gateway: persistence defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Security analysis for S08 - xt-model-gateway: failure injection uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

قبل اعتباره xt-model-gateway يحتاج source of truth وSLO وfailure path production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. State and reliability analysis for S08 - xt-model-gateway: consistency distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RECONCILIATION

Verify returned state before accepting model response with route metadata. Security analysis for S08 - xt-model-gateway: reconciliation uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

RECOVERY

Restore semantic correctness, not process uptime alone. Security analysis for S08 - xt-model-gateway: recovery uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S08

Trigger	Name the condition that activates S08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S08 - xt-model-gateway.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S08 - xt-model-gateway: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Deployment analysis for S08 - xt-model-gateway: identity has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SECRETS

Reference, rotate and audit secrets without logging values. Security analysis for S08 - xt-model-gateway: secrets uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

AUDIT

Link request, policy, mutation, postcondition and release version. Service contract for S08 - xt-model-gateway: audit defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

قبل اعتباره xt-model-gateway يحتاج source of truth وSLO وfailure path صريحة.
production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Deployment analysis for S08 - xt-model-gateway: input defense has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OBSERVABILITY

Traces, metrics and logs cover quality, failover, privacy, cost and downstream failure. Service contract for S08 - xt-model-gateway: observability defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Security analysis for S08 - xt-model-gateway: incident response uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S08

Trigger	Name the condition that activates S08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S08 - xt-model-gateway.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S08 - xt-model-gateway: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-model-gateway schemas, properties and compatibility. Deployment analysis for S08 - xt-model-gateway: unit and contract tests has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

LOAD TESTS

Measure quality, failover, privacy, cost, saturation, queues and backpressure. Security analysis for S08 - xt-model-gateway: load tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

ROLLBACK

Rehearse application and data rollback; report residual state. State and reliability analysis for S08 - xt-model-gateway: rollback distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-model-gateway production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Security analysis for S08 - xt-model-gateway: integration tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

CANARY

Promote a small cohort with comparison and rollback threshold. State and reliability analysis for S08 - xt-model-gateway: canary distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. State and reliability analysis for S08 - xt-model-gateway: release verdict distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX S08

Trigger	Name the condition that activates S08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S08 - xt-model-gateway.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S09 - xt-agent-manager: Purpose and API Contract

SERVICE PURPOSE

xt-agent-manager owns agent lifecycle, missions, quotas, handoffs and merge state. Canonical output: agent execution ledger. Deployment analysis for S09 - xt-agent-manager: service purpose has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Deployment analysis for S09 - xt-agent-manager: ownership has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SLOS

Measure coordination loss, orphan tasks, availability and tail latency. State and reliability analysis for S09 - xt-agent-manager: slos distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

قبل اعتباره xt-agent-manager يحتاج source of truth وSLO وfailure path production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Service contract for S09 - xt-agent-manager: api contract defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Deployment analysis for S09 - xt-agent-manager: dependencies has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Service contract for S09 - xt-agent-manager: boundary defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S09

Trigger	Name the condition that activates S09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S09 - xt-agent-manager.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S09 - xt-agent-manager: State, Data and Consistency

STATE MODEL

xt-agent-manager distinguishes durable state, cache, derived views and telemetry. State and reliability analysis for S09 - xt-agent-manager: state model distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Service contract for S09 - xt-agent-manager: persistence defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Security analysis for S09 - xt-agent-manager: failure injection uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-agent-manager production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. State and reliability analysis for S09 - xt-agent-manager: consistency distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RECONCILIATION

Verify returned state before accepting agent execution ledger. Security analysis for S09 - xt-agent-manager: reconciliation uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

RECOVERY

Restore semantic correctness, not process uptime alone. Security analysis for S09 - xt-agent-manager: recovery uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S09

Trigger	Name the condition that activates S09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S09 - xt-agent-manager.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S09 - xt-agent-manager: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Deployment analysis for S09 - xt-agent-manager: identity has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SECRETS

Reference, rotate and audit secrets without logging values. Security analysis for S09 - xt-agent-manager: secrets uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

AUDIT

Link request, policy, mutation, postcondition and release version. Service contract for S09 - xt-agent-manager: audit defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-agent-manager production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Deployment analysis for S09 - xt-agent-manager: input defense has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OBSERVABILITY

Traces, metrics and logs cover coordination loss, orphan tasks and downstream failure. Service contract for S09 - xt-agent-manager: observability defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Security analysis for S09 - xt-agent-manager: incident response uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S09

Trigger	Name the condition that activates S09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S09 - xt-agent-manager.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S09 - xt-agent-manager: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-agent-manager schemas, properties and compatibility. Deployment analysis for S09 - xt-agent-manager: unit and contract tests has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

LOAD TESTS

Measure coordination loss, orphan tasks, saturation, queues and backpressure. Security analysis for S09 - xt-agent-manager: load tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

ROLLBACK

Rehearse application and data rollback; report residual state. State and reliability analysis for S09 - xt-agent-manager: rollback distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-agent-manager production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Security analysis for S09 - xt-agent-manager: integration tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

CANARY

Promote a small cohort with comparison and rollback threshold. State and reliability analysis for S09 - xt-agent-manager: canary distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. State and reliability analysis for S09 - xt-agent-manager: release verdict distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX S09

Trigger	Name the condition that activates S09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S09 - xt-agent-manager.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S10 - xt-skill-registry: Purpose and API Contract

SERVICE PURPOSE

xt-skill-registry owns HyperSkill registration, activation, versions and deduplication. Canonical output: skill registry record. State and reliability analysis for S10 - xt-skill-registry: service purpose distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. State and reliability analysis for S10 - xt-skill-registry: ownership distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

SLOS

Measure activation precision, duplicate rate, availability and tail latency. Deployment analysis for S10 - xt-skill-registry: slos has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

xt-skill-registry يحتاج source of truth وSLO وfailure path اعتباره قبل production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Security analysis for S10 - xt-skill-registry: api contract uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. State and reliability analysis for S10 - xt-skill-registry: dependencies distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Security analysis for S10 - xt-skill-registry: boundary uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S10

Trigger	Name the condition that activates S10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S10 - xt-skill-registry.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S10 - xt-skill-registry: State, Data and Consistency

STATE MODEL

xt-skill-registry distinguishes durable state, cache, derived views and telemetry. Deployment analysis for S10 - xt-skill-registry: state model has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Security analysis for S10 - xt-skill-registry: persistence uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Service contract for S10 - xt-skill-registry: failure injection defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-skill-registry يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. Deployment analysis for S10 - xt-skill-registry: consistency has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

RECONCILIATION

Verify returned state before accepting skill registry record. Service contract for S10 - xt-skill-registry: reconciliation defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RECOVERY

Restore semantic correctness, not process uptime alone. Service contract for S10 - xt-skill-registry: recovery defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S10

Trigger	Name the condition that activates S10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S10 - xt-skill-registry.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S10 - xt-skill-registry: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. State and reliability analysis for S10 - xt-skill-registry: identity distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

SECRETS

Reference, rotate and audit secrets without logging values. Service contract for S10 - xt-skill-registry: secrets defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

AUDIT

Link request, policy, mutation, postcondition and release version. Security analysis for S10 - xt-skill-registry: audit uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

xt-skill-registry يحتاج source of truth وSLO وfailure path اعتباره قبل production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. State and reliability analysis for S10 - xt-skill-registry: input defense distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OBSERVABILITY

Traces, metrics and logs cover activation precision, duplicate rate and downstream failure. Security analysis for S10 - xt-skill-registry: observability uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Service contract for S10 - xt-skill-registry: incident response defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S10

Trigger	Name the condition that activates S10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S10 - xt-skill-registry.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S10 - xt-skill-registry: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-skill-registry schemas, properties and compatibility. State and reliability analysis for S10 - xt-skill-registry: unit and contract tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

LOAD TESTS

Measure activation precision, duplicate rate, saturation, queues and backpressure. Service contract for S10 - xt-skill-registry: load tests defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

ROLLBACK

Rehearse application and data rollback; report residual state. Deployment analysis for S10 - xt-skill-registry: rollback has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

xt-skill-registry يحتاج source of truth وSLO وfailure path اعتباره قبل production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Service contract for S10 - xt-skill-registry: integration tests defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

CANARY

Promote a small cohort with comparison and rollback threshold. Deployment analysis for S10 - xt-skill-registry: canary has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. Deployment analysis for S10 - xt-skill-registry: release verdict has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX S10

Trigger	Name the condition that activates S10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S10 - xt-skill-registry.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S11 - xt-knowledge-service: Purpose and API Contract

SERVICE PURPOSE

xt-knowledge-service owns hybrid retrieval, provenance, GraphRAG and substrate health. Canonical output: knowledge packet. Deployment analysis for S11 - xt-knowledge-service: service purpose has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Deployment analysis for S11 - xt-knowledge-service: ownership has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SLOS

Measure precision, freshness, retrieval latency, availability and tail latency. State and reliability analysis for S11 - xt-knowledge-service: slos distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-knowledge-service production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Service contract for S11 - xt-knowledge-service: api contract defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Deployment analysis for S11 - xt-knowledge-service: dependencies has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Service contract for S11 - xt-knowledge-service: boundary defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S11

Trigger	Name the condition that activates S11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S11 - xt-knowledge-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S11 - xt-knowledge-service: State, Data and Consistency

STATE MODEL

xt-knowledge-service distinguishes durable state, cache, derived views and telemetry. State and reliability analysis for S11 - xt-knowledge-service: state model distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Service contract for S11 - xt-knowledge-service: persistence defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Security analysis for S11 - xt-knowledge-service: failure injection uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

قبل اعتباره xt-knowledge-service يحتاج source of truth وSLO وfailure path production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. State and reliability analysis for S11 - xt-knowledge-service: consistency distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RECONCILIATION

Verify returned state before accepting knowledge packet. Security analysis for S11 - xt-knowledge-service: reconciliation uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

RECOVERY

Restore semantic correctness, not process uptime alone. Security analysis for S11 - xt-knowledge-service: recovery uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S11

Trigger	Name the condition that activates S11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S11 - xt-knowledge-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S11 - xt-knowledge-service: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Deployment analysis for S11 - xt-knowledge-service: identity has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SECRETS

Reference, rotate and audit secrets without logging values. Security analysis for S11 - xt-knowledge-service: secrets uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

AUDIT

Link request, policy, mutation, postcondition and release version. Service contract for S11 - xt-knowledge-service: audit defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Security analysis for S11 - xt-knowledge-service: incident response uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-knowledge-service production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Deployment analysis for S11 - xt-knowledge-service: input defense has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OBSERVABILITY

Traces, metrics and logs cover precision, freshness, retrieval latency and downstream failure. Service contract for S11 - xt-knowledge-service: observability defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S11

Trigger	Name the condition that activates S11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S11 - xt-knowledge-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S11 - xt-knowledge-service: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-knowledge-service schemas, properties and compatibility. Deployment analysis for S11 - xt-knowledge-service: unit and contract tests has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

LOAD TESTS

Measure precision, freshness, retrieval latency, saturation, queues and backpressure. Security analysis for S11 - xt-knowledge-service: load tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

ROLLBACK

Rehearse application and data rollback; report residual state. State and reliability analysis for S11 - xt-knowledge-service: rollback distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-knowledge-service production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Security analysis for S11 - xt-knowledge-service: integration tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

CANARY

Promote a small cohort with comparison and rollback threshold. State and reliability analysis for S11 - xt-knowledge-service: canary distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. State and reliability analysis for S11 - xt-knowledge-service: release verdict distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX S11

Trigger	Name the condition that activates S11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S11 - xt-knowledge-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S12 - xt-memory-service: Purpose and API Contract

SERVICE PURPOSE

xt-memory-service owns episodic, semantic, procedural and canonical memory policy. Canonical output: memory read/write packet. State and reliability analysis for S12 - xt-memory-service: service purpose distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. State and reliability analysis for S12 - xt-memory-service: ownership distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

SLOS

Measure usefulness, staleness, privacy, availability and tail latency. Deployment analysis for S12 - xt-memory-service: slos has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

قبل اعتباره xt-memory-service يحتاج source of truth وSLO وfailure path production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Security analysis for S12 - xt-memory-service: api contract uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. State and reliability analysis for S12 - xt-memory-service: dependencies distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Security analysis for S12 - xt-memory-service: boundary uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S12

Trigger	Name the condition that activates S12; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S12 - xt-memory-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S12 - xt-memory-service: State, Data and Consistency

STATE MODEL

xt-memory-service distinguishes durable state, cache, derived views and telemetry. Deployment analysis for S12 - xt-memory-service: state model has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Security analysis for S12 - xt-memory-service: persistence uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Service contract for S12 - xt-memory-service: failure injection defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

قبل اعتباره xt-memory-service يحتاج source of truth وSLO وfailure path production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. Deployment analysis for S12 - xt-memory-service: consistency has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

RECONCILIATION

Verify returned state before accepting memory read/write packet. Service contract for S12 - xt-memory-service: reconciliation defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RECOVERY

Restore semantic correctness, not process uptime alone. Service contract for S12 - xt-memory-service: recovery defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX S12

Trigger	Name the condition that activates S12; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S12 - xt-memory-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S12 - xt-memory-service: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. State and reliability analysis for S12 - xt-memory-service: identity distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

SECRETS

Reference, rotate and audit secrets without logging values. Service contract for S12 - xt-memory-service: secrets defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

AUDIT

Link request, policy, mutation, postcondition and release version. Security analysis for S12 - xt-memory-service: audit uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

قبل اعتباره xt-memory-service يحتاج source of truth وSLO وfailure path production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. State and reliability analysis for S12 - xt-memory-service: input defense distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OBSERVABILITY

Traces, metrics and logs cover usefulness, staleness, privacy and downstream failure. Security analysis for S12 - xt-memory-service: observability uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Service contract for S12 - xt-memory-service: incident response defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S12

Trigger	Name the condition that activates S12; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S12 - xt-memory-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S12 - xt-memory-service: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-memory-service schemas, properties and compatibility. State and reliability analysis for S12 - xt-memory-service: unit and contract tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

LOAD TESTS

Measure usefulness, staleness, privacy, saturation, queues and backpressure. Service contract for S12 - xt-memory-service: load tests defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

ROLLBACK

Rehearse application and data rollback; report residual state. Deployment analysis for S12 - xt-memory-service: rollback has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

قبل اعتباره xt-memory-service يحتاج source of truth وSLO وfailure path production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Service contract for S12 - xt-memory-service: integration tests defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

CANARY

Promote a small cohort with comparison and rollback threshold. Deployment analysis for S12 - xt-memory-service: canary has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. Deployment analysis for S12 - xt-memory-service: release verdict has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX

S12

Trigger	Name the condition that activates S12; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S12 - xt-memory-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S13 - xt-tool-gateway: Purpose and API Contract

SERVICE PURPOSE

xt-tool-gateway owns typed tool discovery, invocation, permissions and state reconciliation. Canonical output: tool execution result. Service contract for S13 - xt-tool-gateway: service purpose defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Service contract for S13 - xt-tool-gateway: ownership defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

SLOS

Measure success, misuse, postcondition, availability and tail latency. Security analysis for S13 - xt-tool-gateway: slos uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

xt-tool-gateway يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. State and reliability analysis for S13 - xt-tool-gateway: api contract distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Service contract for S13 - xt-tool-gateway: dependencies defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. State and reliability analysis for S13 - xt-tool-gateway: boundary distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX

S13

Trigger	Name the condition that activates S13; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S13 - xt-tool-gateway.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S13 - xt-tool-gateway: State, Data and Consistency

STATE MODEL

xt-tool-gateway distinguishes durable state, cache, derived views and telemetry. Security analysis for S13 - xt-tool-gateway: state model uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. State and reliability analysis for S13 - xt-tool-gateway: persistence distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Deployment analysis for S13 - xt-tool-gateway: failure injection has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

xt-tool-gateway يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. Security analysis for S13 - xt-tool-gateway: consistency uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

RECONCILIATION

Verify returned state before accepting tool execution result. Deployment analysis for S13 - xt-tool-gateway: reconciliation has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

RECOVERY

Restore semantic correctness, not process uptime alone. Deployment analysis for S13 - xt-tool-gateway: recovery has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX

S13

Trigger	Name the condition that activates S13; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S13 - xt-tool-gateway.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S13 - xt-tool-gateway: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Service contract for S13 - xt-tool-gateway: identity defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

SECRETS

Reference, rotate and audit secrets without logging values. Deployment analysis for S13 - xt-tool-gateway: secrets has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

AUDIT

Link request, policy, mutation, postcondition and release version. State and reliability analysis for S13 - xt-tool-gateway: audit distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

xt-tool-gateway يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Service contract for S13 - xt-tool-gateway: input defense defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OBSERVABILITY

Traces, metrics and logs cover success, misuse, postcondition and downstream failure. State and reliability analysis for S13 - xt-tool-gateway: observability distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Deployment analysis for S13 - xt-tool-gateway: incident response has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX — S13

Trigger	Name the condition that activates S13; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S13 - xt-tool-gateway.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S13 - xt-tool-gateway: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-tool-gateway schemas, properties and compatibility. Service contract for S13 - xt-tool-gateway: unit and contract tests defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

LOAD TESTS

Measure success, misuse, postcondition, saturation, queues and backpressure. Deployment analysis for S13 - xt-tool-gateway: load tests has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

ROLLBACK

Rehearse application and data rollback; report residual state. Security analysis for S13 - xt-tool-gateway: rollback uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

xt-tool-gateway يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Deployment analysis for S13 - xt-tool-gateway: integration tests has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

CANARY

Promote a small cohort with comparison and rollback threshold. Security analysis for S13 - xt-tool-gateway: canary uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. Security analysis for S13 - xt-tool-gateway: release verdict uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX S13

Trigger	Name the condition that activates S13; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S13 - xt-tool-gateway.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S14 - xt-sandbox-controller: Purpose and API Contract

SERVICE PURPOSE

xt-sandbox-controller owns filesystem, process, AST/regex validation and isolated execution. Canonical output: sandbox session and mutation report. Service contract for S14 - xt-sandbox-controller: service purpose defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Service contract for S14 - xt-sandbox-controller: ownership defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

SLOS

Measure escape rate, containment, cleanup, availability and tail latency. Security analysis for S14 - xt-sandbox-controller: slos uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

قبل اعتباره xt-sandbox-controller يحتاج source of truth وSLO وfailure path production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. State and reliability analysis for S14 - xt-sandbox-controller: api contract distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Service contract for S14 - xt-sandbox-controller: dependencies defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. State and reliability analysis for S14 - xt-sandbox-controller: boundary distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX

S14

Trigger	Name the condition that activates S14; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S14 - xt-sandbox-controller.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S14 - xt-sandbox-controller: State, Data and Consistency

STATE MODEL

xt-sandbox-controller distinguishes durable state, cache, derived views and telemetry. Security analysis for S14 - xt-sandbox-controller: state model uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. State and reliability analysis for S14 - xt-sandbox-controller: persistence distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Deployment analysis for S14 - xt-sandbox-controller: failure injection has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-sandbox-controller production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. Security analysis for S14 - xt-sandbox-controller: consistency uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

RECONCILIATION

Verify returned state before accepting sandbox session and mutation report. Deployment analysis for S14 - xt-sandbox-controller: reconciliation has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

RECOVERY

Restore semantic correctness, not process uptime alone. Deployment analysis for S14 - xt-sandbox-controller: recovery has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX

S14

Trigger	Name the condition that activates S14; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S14 - xt-sandbox-controller.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S14 - xt-sandbox-controller: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Service contract for S14 - xt-sandbox-controller: identity defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

SECRETS

Reference, rotate and audit secrets without logging values. Deployment analysis for S14 - xt-sandbox-controller: secrets has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

AUDIT

Link request, policy, mutation, postcondition and release version. State and reliability analysis for S14 - xt-sandbox-controller: audit distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-sandbox-controller production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Service contract for S14 - xt-sandbox-controller: input defense defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OBSERVABILITY

Traces, metrics and logs cover escape rate, containment, cleanup and downstream failure. State and reliability analysis for S14 - xt-sandbox-controller: observability distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Deployment analysis for S14 - xt-sandbox-controller: incident response has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX

S14

Trigger	Name the condition that activates S14; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S14 - xt-sandbox-controller.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S14 - xt-sandbox-controller: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-sandbox-controller schemas, properties and compatibility. Service contract for S14 - xt-sandbox-controller: unit and contract tests defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

LOAD TESTS

Measure escape rate, containment, cleanup, saturation, queues and backpressure. Deployment analysis for S14 - xt-sandbox-controller: load tests has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

ROLLBACK

Rehearse application and data rollback; report residual state. Security analysis for S14 - xt-sandbox-controller: rollback uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-sandbox-controller production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Deployment analysis for S14 - xt-sandbox-controller: integration tests has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

CANARY

Promote a small cohort with comparison and rollback threshold. Security analysis for S14 - xt-sandbox-controller: canary uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. Security analysis for S14 - xt-sandbox-controller: release verdict uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S14

Trigger	Name the condition that activates S14; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S14 - xt-sandbox-controller.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S15 - xt-world-effect: Purpose and API Contract

SERVICE PURPOSE

xt-world-effect owns expected delta, returned state, reconciliation and closure. Canonical output: world-effect record. Deployment analysis for S15 - xt-world-effect: service purpose has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Deployment analysis for S15 - xt-world-effect: ownership has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SLOS

Measure false success, closure time, availability and tail latency. State and reliability analysis for S15 - xt-world-effect: slos distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

xt-world-effect يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Service contract for S15 - xt-world-effect: api contract defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Deployment analysis for S15 - xt-world-effect: dependencies has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Service contract for S15 - xt-world-effect: boundary defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S15

Trigger	Name the condition that activates S15; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S15 - xt-world-effect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S15 - xt-world-effect: State, Data and Consistency

STATE MODEL

xt-world-effect distinguishes durable state, cache, derived views and telemetry. State and reliability analysis for S15 - xt-world-effect: state model distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Service contract for S15 - xt-world-effect: persistence defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Security analysis for S15 - xt-world-effect: failure injection uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

xt-world-effect يحتاج source of truth وSLO وfailure path اعتباره قبل production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. State and reliability analysis for S15 - xt-world-effect: consistency distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RECONCILIATION

Verify returned state before accepting world-effect record. Security analysis for S15 - xt-world-effect: reconciliation uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

RECOVERY

Restore semantic correctness, not process uptime alone. Security analysis for S15 - xt-world-effect: recovery uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S15

Trigger	Name the condition that activates S15; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S15 - xt-world-effect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S15 - xt-world-effect: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Deployment analysis for S15 - xt-world-effect: identity has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SECRETS

Reference, rotate and audit secrets without logging values. Security analysis for S15 - xt-world-effect: secrets uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

AUDIT

Link request, policy, mutation, postcondition and release version. Service contract for S15 - xt-world-effect: audit defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-world-effect يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Deployment analysis for S15 - xt-world-effect: input defense has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OBSERVABILITY

Traces, metrics and logs cover false success, closure time and downstream failure. Service contract for S15 - xt-world-effect: observability defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Security analysis for S15 - xt-world-effect: incident response uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S15

Trigger	Name the condition that activates S15; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S15 - xt-world-effect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S15 - xt-world-effect: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-world-effect schemas, properties and compatibility. Deployment analysis for S15 - xt-world-effect: unit and contract tests has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

LOAD TESTS

Measure false success, closure time, saturation, queues and backpressure. Security analysis for S15 - xt-world-effect: load tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

ROLLBACK

Rehearse application and data rollback; report residual state. State and reliability analysis for S15 - xt-world-effect: rollback distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

xt-world-effect يحتاج source of truth وSLO وfailure path اعتباره قبل production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Security analysis for S15 - xt-world-effect: integration tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

CANARY

Promote a small cohort with comparison and rollback threshold. State and reliability analysis for S15 - xt-world-effect: canary distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. State and reliability analysis for S15 - xt-world-effect: release verdict distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX S15

Trigger	Name the condition that activates S15; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S15 - xt-world-effect.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S16 - xt-verifier: Purpose and API Contract

SERVICE PURPOSE

xt-verifier owns schema, evidence, artifact and postcondition verification. Canonical output: verification verdict. Security analysis for S16 - xt-verifier: service purpose uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Security analysis for S16 - xt-verifier: ownership uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

SLOS

Measure defect recall, false block, availability and tail latency. Service contract for S16 - xt-verifier: slos defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-verifier يحتاج source of truth وSLO وfailure path اعتباره قبل production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Deployment analysis for S16 - xt-verifier: api contract has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Security analysis for S16 - xt-verifier: dependencies uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Deployment analysis for S16 - xt-verifier: boundary has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX

S16

Trigger	Name the condition that activates S16; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S16 - xt-verifier.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S16 - xt-verifier: State, Data and Consistency

STATE MODEL

xt-verifier distinguishes durable state, cache, derived views and telemetry. Service contract for S16 - xt-verifier: state model defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Deployment analysis for S16 - xt-verifier: persistence has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. State and reliability analysis for S16 - xt-verifier: failure injection distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

xt-verifier يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. Service contract for S16 - xt-verifier: consistency defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RECONCILIATION

Verify returned state before accepting verification verdict. State and reliability analysis for S16 - xt-verifier: reconciliation distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RECOVERY

Restore semantic correctness, not process uptime alone. State and reliability analysis for S16 - xt-verifier: recovery distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX

S16

Trigger	Name the condition that activates S16; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S16 - xt-verifier.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S16 - xt-verifier: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Security analysis for S16 - xt-verifier: identity uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

SECRETS

Reference, rotate and audit secrets without logging values. State and reliability analysis for S16 - xt-verifier: secrets distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

AUDIT

Link request, policy, mutation, postcondition and release version. Deployment analysis for S16 - xt-verifier: audit has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

xt-verifier يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Security analysis for S16 - xt-verifier: input defense uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OBSERVABILITY

Traces, metrics and logs cover defect recall, false block and downstream failure. Deployment analysis for S16 - xt-verifier: observability has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. State and reliability analysis for S16 - xt-verifier: incident response distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX

S16

Trigger	Name the condition that activates S16; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S16 - xt-verifier.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S16 - xt-verifier: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-verifier schemas, properties and compatibility. Security analysis for S16 - xt-verifier: unit and contract tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

LOAD TESTS

Measure defect recall, false block, saturation, queues and backpressure. State and reliability analysis for S16 - xt-verifier: load tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

ROLLBACK

Rehearse application and data rollback; report residual state. Service contract for S16 - xt-verifier: rollback defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-verifier يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. State and reliability analysis for S16 - xt-verifier: integration tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

CANARY

Promote a small cohort with comparison and rollback threshold. Service contract for S16 - xt-verifier: canary defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. Service contract for S16 - xt-verifier: release verdict defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX S16

Trigger	Name the condition that activates S16; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S16 - xt-verifier.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S17 - xt-falsification-court: Purpose and API Contract

SERVICE PURPOSE

xt-falsification-court owns counterexample generation, destructive review and claim rejection. Canonical output: court docket. State and reliability analysis for S17 - xt-falsification-court: service purpose distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. State and reliability analysis for S17 - xt-falsification-court: ownership distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

SLOS

Measure critical defect discovery, independence, availability and tail latency. Deployment analysis for S17 - xt-falsification-court: slos has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

قبل اعتباره xt-falsification-court يحتاج source of truth وSLO وfailure path production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Security analysis for S17 - xt-falsification-court: api contract uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. State and reliability analysis for S17 - xt-falsification-court: dependencies distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Security analysis for S17 - xt-falsification-court: boundary uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S17

Trigger	Name the condition that activates S17; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S17 - xt-falsification-court.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S17 - xt-falsification-court: State, Data and Consistency

STATE MODEL

xt-falsification-court distinguishes durable state, cache, derived views and telemetry. Deployment analysis for S17 - xt-falsification-court: state model has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Security analysis for S17 - xt-falsification-court: persistence uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Service contract for S17 - xt-falsification-court: failure injection defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-falsification-court production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. Deployment analysis for S17 - xt-falsification-court: consistency has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

RECONCILIATION

Verify returned state before accepting court docket. Service contract for S17 - xt-falsification-court: reconciliation defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RECOVERY

Restore semantic correctness, not process uptime alone. Service contract for S17 - xt-falsification-court: recovery defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S17

Trigger	Name the condition that activates S17; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S17 - xt-falsification-court.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S17 - xt-falsification-court: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. State and reliability analysis for S17 - xt-falsification-court: identity distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

SECRETS

Reference, rotate and audit secrets without logging values. Service contract for S17 - xt-falsification-court: secrets defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

AUDIT

Link request, policy, mutation, postcondition and release version. Security analysis for S17 - xt-falsification-court: audit uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-falsification-court production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. State and reliability analysis for S17 - xt-falsification-court: input defense distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OBSERVABILITY

Traces, metrics and logs cover critical defect discovery, independence and downstream failure. Security analysis for S17 - xt-falsification-court: observability uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Service contract for S17 - xt-falsification-court: incident response defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S17

Trigger	Name the condition that activates S17; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S17 - xt-falsification-court.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S17 - xt-falsification-court: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-falsification-court schemas, properties and compatibility. State and reliability analysis for S17 - xt-falsification-court: unit and contract tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

LOAD TESTS

Measure critical defect discovery, independence, saturation, queues and backpressure. Service contract for S17 - xt-falsification-court: load tests defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

ROLLBACK

Rehearse application and data rollback; report residual state. Deployment analysis for S17 - xt-falsification-court: rollback has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

xt-falsification-court يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Service contract for S17 - xt-falsification-court: integration tests defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

CANARY

Promote a small cohort with comparison and rollback threshold. Deployment analysis for S17 - xt-falsification-court: canary has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. Deployment analysis for S17 - xt-falsification-court: release verdict has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX

S17

Trigger	Name the condition that activates S17; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S17 - xt-falsification-court.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S18 - xt-recovery-service: Purpose and API Contract

SERVICE PURPOSE

xt-recovery-service owns checkpoints, retries, compensation, rollback and degraded mode. Canonical output: recovery packet. State and reliability analysis for S18 - xt-recovery-service: service purpose distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. State and reliability analysis for S18 - xt-recovery-service: ownership distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

SLOS

Measure RTO, RPO, rollback success, availability and tail latency. Deployment analysis for S18 - xt-recovery-service: slos has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

قبل اعتباره xt-recovery-service يحتاج source of truth وSLO وfailure path صريحة وdependency budget وrollback وcompensation وidempotency وobservability وtest restart وduplicate delivery وnetwork partition وcorrupted record وclock skew وrecovery objectives وauthority وsecurity وcost وqueue depth وdownstream failures وcanary وownership records. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity. production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Security analysis for S18 - xt-recovery-service: api contract uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. State and reliability analysis for S18 - xt-recovery-service: dependencies distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Security analysis for S18 - xt-recovery-service: boundary uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S18

Trigger	Name the condition that activates S18; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S18 - xt-recovery-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S18 - xt-recovery-service: State, Data and Consistency

STATE MODEL

xt-recovery-service distinguishes durable state, cache, derived views and telemetry. Deployment analysis for S18 - xt-recovery-service: state model has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Security analysis for S18 - xt-recovery-service: persistence uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Service contract for S18 - xt-recovery-service: failure injection defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-recovery-service production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. Deployment analysis for S18 - xt-recovery-service: consistency has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

RECONCILIATION

Verify returned state before accepting recovery packet. Service contract for S18 - xt-recovery-service: reconciliation defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RECOVERY

Restore semantic correctness, not process uptime alone. Service contract for S18 - xt-recovery-service: recovery defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S18

Trigger	Name the condition that activates S18; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S18 - xt-recovery-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S18 - xt-recovery-service: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. State and reliability analysis for S18 - xt-recovery-service: identity distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

SECRETS

Reference, rotate and audit secrets without logging values. Service contract for S18 - xt-recovery-service: secrets defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

AUDIT

Link request, policy, mutation, postcondition and release version. Security analysis for S18 - xt-recovery-service: audit uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-recovery-service production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. State and reliability analysis for S18 - xt-recovery-service: input defense distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OBSERVABILITY

Traces, metrics and logs cover RTO, RPO, rollback success and downstream failure. Security analysis for S18 - xt-recovery-service: observability uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Service contract for S18 - xt-recovery-service: incident response defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S18

Trigger	Name the condition that activates S18; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S18 - xt-recovery-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S18 - xt-recovery-service: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-recovery-service schemas, properties and compatibility. State and reliability analysis for S18 - xt-recovery-service: unit and contract tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

LOAD TESTS

Measure RTO, RPO, rollback success, saturation, queues and backpressure. Service contract for S18 - xt-recovery-service: load tests defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

ROLLBACK

Rehearse application and data rollback; report residual state. Deployment analysis for S18 - xt-recovery-service: rollback has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-recovery-service production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Service contract for S18 - xt-recovery-service: integration tests defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

CANARY

Promote a small cohort with comparison and rollback threshold. Deployment analysis for S18 - xt-recovery-service: canary has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. Deployment analysis for S18 - xt-recovery-service: release verdict has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX

S18

Trigger	Name the condition that activates S18; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S18 - xt-recovery-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S19 - xt-learning-service: Purpose and API Contract

SERVICE PURPOSE

xt-learning-service owns trace curation, skill synthesis, LoRA/SFT/DPO proposals and gates. Canonical output: learning proposal. Deployment analysis for S19 - xt-learning-service: service purpose has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Deployment analysis for S19 - xt-learning-service: ownership has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SLOS

Measure net gain, regression, rollback, availability and tail latency. State and reliability analysis for S19 - xt-learning-service: slos distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-learning-service production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Service contract for S19 - xt-learning-service: api contract defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Deployment analysis for S19 - xt-learning-service: dependencies has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Service contract for S19 - xt-learning-service: boundary defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S19

Trigger	Name the condition that activates S19; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S19 - xt-learning-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S19 - xt-learning-service: State, Data and Consistency

STATE MODEL

xt-learning-service distinguishes durable state, cache, derived views and telemetry. State and reliability analysis for S19 - xt-learning-service: state model distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Service contract for S19 - xt-learning-service: persistence defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Security analysis for S19 - xt-learning-service: failure injection uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

قبل اعتباره xt-learning-service يحتاج source of truth وSLO وfailure path production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. State and reliability analysis for S19 - xt-learning-service: consistency distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RECONCILIATION

Verify returned state before accepting learning proposal. Security analysis for S19 - xt-learning-service: reconciliation uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

RECOVERY

Restore semantic correctness, not process uptime alone. Security analysis for S19 - xt-learning-service: recovery uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S19

Trigger	Name the condition that activates S19; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S19 - xt-learning-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S19 - xt-learning-service: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Deployment analysis for S19 - xt-learning-service: identity has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SECRETS

Reference, rotate and audit secrets without logging values. Security analysis for S19 - xt-learning-service: secrets uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

AUDIT

Link request, policy, mutation, postcondition and release version. Service contract for S19 - xt-learning-service: audit defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-learning-service production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Deployment analysis for S19 - xt-learning-service: input defense has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OBSERVABILITY

Traces, metrics and logs cover net gain, regression, rollback and downstream failure. Service contract for S19 - xt-learning-service: observability defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Security analysis for S19 - xt-learning-service: incident response uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S19

Trigger	Name the condition that activates S19; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S19 - xt-learning-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S19 - xt-learning-service: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-learning-service schemas, properties and compatibility. Deployment analysis for S19 - xt-learning-service: unit and contract tests has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

LOAD TESTS

Measure net gain, regression, rollback, saturation, queues and backpressure. Security analysis for S19 - xt-learning-service: load tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

ROLLBACK

Rehearse application and data rollback; report residual state. State and reliability analysis for S19 - xt-learning-service: rollback distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-learning-service production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Security analysis for S19 - xt-learning-service: integration tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

CANARY

Promote a small cohort with comparison and rollback threshold. State and reliability analysis for S19 - xt-learning-service: canary distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. State and reliability analysis for S19 - xt-learning-service: release verdict distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX			S19
Trigger	Name the condition that activates S19; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S19 - xt-learning-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S20 - xt-evaluation-service: Purpose and API Contract

SERVICE PURPOSE

xt-evaluation-service owns benchmarks, ablations, transfer and promotion evidence. Canonical output: evaluation report. Deployment analysis for S20 - xt-evaluation-service: service purpose has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Deployment analysis for S20 - xt-evaluation-service: ownership has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SLOS

Measure generalization, leakage resistance, availability and tail latency. State and reliability analysis for S20 - xt-evaluation-service: slos distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-evaluation-service production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Service contract for S20 - xt-evaluation-service: api contract defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Deployment analysis for S20 - xt-evaluation-service: dependencies has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Service contract for S20 - xt-evaluation-service: boundary defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S20

Trigger	Name the condition that activates S20; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S20 - xt-evaluation-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S20 - xt-evaluation-service: State, Data and Consistency

STATE MODEL

xt-evaluation-service distinguishes durable state, cache, derived views and telemetry. State and reliability analysis for S20 - xt-evaluation-service: state model distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Service contract for S20 - xt-evaluation-service: persistence defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Security analysis for S20 - xt-evaluation-service: failure injection uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

قبل اعتباره xt-evaluation-service يحتاج source of truth وSLO وfailure path production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. State and reliability analysis for S20 - xt-evaluation-service: consistency distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RECONCILIATION

Verify returned state before accepting evaluation report. Security analysis for S20 - xt-evaluation-service: reconciliation uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

RECOVERY

Restore semantic correctness, not process uptime alone. Security analysis for S20 - xt-evaluation-service: recovery uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S20

Trigger	Name the condition that activates S20; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S20 - xt-evaluation-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S20 - xt-evaluation-service: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Deployment analysis for S20 - xt-evaluation-service: identity has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

SECRETS

Reference, rotate and audit secrets without logging values. Security analysis for S20 - xt-evaluation-service: secrets uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

AUDIT

Link request, policy, mutation, postcondition and release version. Service contract for S20 - xt-evaluation-service: audit defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-evaluation-service production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Deployment analysis for S20 - xt-evaluation-service: input defense has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OBSERVABILITY

Traces, metrics and logs cover generalization, leakage resistance and downstream failure. Service contract for S20 - xt-evaluation-service: observability defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Security analysis for S20 - xt-evaluation-service: incident response uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S20

Trigger	Name the condition that activates S20; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S20 - xt-evaluation-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S20 - xt-evaluation-service: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-evaluation-service schemas, properties and compatibility. Deployment analysis for S20 - xt-evaluation-service: unit and contract tests has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

LOAD TESTS

Measure generalization, leakage resistance, saturation, queues and backpressure. Security analysis for S20 - xt-evaluation-service: load tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

ROLLBACK

Rehearse application and data rollback; report residual state. State and reliability analysis for S20 - xt-evaluation-service: rollback distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

قبل اعتباره failure path وSLO وsource of truth يحتاج xt-evaluation-service production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Security analysis for S20 - xt-evaluation-service: integration tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

CANARY

Promote a small cohort with comparison and rollback threshold. State and reliability analysis for S20 - xt-evaluation-service: canary distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. State and reliability analysis for S20 - xt-evaluation-service: release verdict distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX			S20
Trigger	Name the condition that activates S20; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S20 - xt-evaluation-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S21 - xt-observability: Purpose and API Contract

SERVICE PURPOSE

xt-observability owns traces, metrics, cost, drift, incidents and replay. Canonical output: observability ledger. State and reliability analysis for S21 - xt-observability: service purpose distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. State and reliability analysis for S21 - xt-observability: ownership distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

SLOS

Measure trace coverage, diagnostic time, availability and tail latency. Deployment analysis for S21 - xt-observability: slos has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

xt-observability يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Security analysis for S21 - xt-observability: api contract uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. State and reliability analysis for S21 - xt-observability: dependencies distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Security analysis for S21 - xt-observability: boundary uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S21

Trigger	Name the condition that activates S21; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S21 - xt-observability.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S21 - xt-observability: State, Data and Consistency

STATE MODEL

xt-observability distinguishes durable state, cache, derived views and telemetry. Deployment analysis for S21 - xt-observability: state model has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Security analysis for S21 - xt-observability: persistence uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Service contract for S21 - xt-observability: failure injection defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-observability يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. Deployment analysis for S21 - xt-observability: consistency has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

RECONCILIATION

Verify returned state before accepting observability ledger. Service contract for S21 - xt-observability: reconciliation defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RECOVERY

Restore semantic correctness, not process uptime alone. Service contract for S21 - xt-observability: recovery defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S21

Trigger	Name the condition that activates S21; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S21 - xt-observability.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S21 - xt-observability: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. State and reliability analysis for S21 - xt-observability: identity distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

SECRETS

Reference, rotate and audit secrets without logging values. Service contract for S21 - xt-observability: secrets defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

AUDIT

Link request, policy, mutation, postcondition and release version. Security analysis for S21 - xt-observability: audit uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

xt-observability يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. State and reliability analysis for S21 - xt-observability: input defense distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OBSERVABILITY

Traces, metrics and logs cover trace coverage, diagnostic time and downstream failure. Security analysis for S21 - xt-observability: observability uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Service contract for S21 - xt-observability: incident response defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S21

Trigger	Name the condition that activates S21; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S21 - xt-observability.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S21 - xt-observability: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-observability schemas, properties and compatibility. State and reliability analysis for S21 - xt-observability: unit and contract tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

LOAD TESTS

Measure trace coverage, diagnostic time, saturation, queues and backpressure. Service contract for S21 - xt-observability: load tests defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

ROLLBACK

Rehearse application and data rollback; report residual state. Deployment analysis for S21 - xt-observability: rollback has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

xt-observability يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Service contract for S21 - xt-observability: integration tests defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

CANARY

Promote a small cohort with comparison and rollback threshold. Deployment analysis for S21 - xt-observability: canary has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. Deployment analysis for S21 - xt-observability: release verdict has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX

S21

Trigger	Name the condition that activates S21; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S21 - xt-observability.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S22 - xt-policy-engine: Purpose and API Contract

SERVICE PURPOSE

xt-policy-engine owns T0-T4 classification, authorization, constraints and revocation. Canonical output: policy decision. Security analysis for S22 - xt-policy-engine: service purpose uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. Security analysis for S22 - xt-policy-engine: ownership uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

SLOS

Measure false allow, revocation latency, availability and tail latency. Service contract for S22 - xt-policy-engine: slos defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-policy-engine يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Deployment analysis for S22 - xt-policy-engine: api contract has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. Security analysis for S22 - xt-policy-engine: dependencies uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Deployment analysis for S22 - xt-policy-engine: boundary has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX

S22

Trigger	Name the condition that activates S22; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S22 - xt-policy-engine.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S22 - xt-policy-engine: State, Data and Consistency

STATE MODEL

xt-policy-engine distinguishes durable state, cache, derived views and telemetry. Service contract for S22 - xt-policy-engine: state model defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Deployment analysis for S22 - xt-policy-engine: persistence has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. State and reliability analysis for S22 - xt-policy-engine: failure injection distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

xt-policy-engine يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. Service contract for S22 - xt-policy-engine: consistency defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RECONCILIATION

Verify returned state before accepting policy decision. State and reliability analysis for S22 - xt-policy-engine: reconciliation distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

RECOVERY

Restore semantic correctness, not process uptime alone. State and reliability analysis for S22 - xt-policy-engine: recovery distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX

S22

Trigger	Name the condition that activates S22; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S22 - xt-policy-engine.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S22 - xt-policy-engine: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. Security analysis for S22 - xt-policy-engine: identity uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

SECRETS

Reference, rotate and audit secrets without logging values. State and reliability analysis for S22 - xt-policy-engine: secrets distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

AUDIT

Link request, policy, mutation, postcondition and release version. Deployment analysis for S22 - xt-policy-engine: audit has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

xt-policy-engine يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. Security analysis for S22 - xt-policy-engine: input defense uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OBSERVABILITY

Traces, metrics and logs cover false allow, revocation latency and downstream failure. Deployment analysis for S22 - xt-policy-engine: observability has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. State and reliability analysis for S22 - xt-policy-engine: incident response distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OPERATIONAL EVIDENCE MATRIX

S22

Trigger	Name the condition that activates S22; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S22 - xt-policy-engine.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S22 - xt-policy-engine: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-policy-engine schemas, properties and compatibility. Security analysis for S22 - xt-policy-engine: unit and contract tests uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

LOAD TESTS

Measure false allow, revocation latency, saturation, queues and backpressure. State and reliability analysis for S22 - xt-policy-engine: load tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

ROLLBACK

Rehearse application and data rollback; report residual state. Service contract for S22 - xt-policy-engine: rollback defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-policy-engine يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. State and reliability analysis for S22 - xt-policy-engine: integration tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

CANARY

Promote a small cohort with comparison and rollback threshold. Service contract for S22 - xt-policy-engine: canary defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. Service contract for S22 - xt-policy-engine: release verdict defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S22

Trigger	Name the condition that activates S22; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S22 - xt-policy-engine.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S23 - xt-audit-service: Purpose and API Contract

SERVICE PURPOSE

xt-audit-service owns integrity, provenance, versions, evidence, authority and release audits. Canonical output: audit report. State and reliability analysis for S23 - xt-audit-service: service purpose distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OWNERSHIP

One source of truth and accountable owner; avoid duplicated business logic. State and reliability analysis for S23 - xt-audit-service: ownership distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

SLOS

Measure coverage, unresolved critical defects, availability and tail latency. Deployment analysis for S23 - xt-audit-service: slos has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

xt-audit-service يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

API CONTRACT

Versioned request/response, auth, idempotency, timeout and error taxonomy. Security analysis for S23 - xt-audit-service: api contract uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

DEPENDENCIES

Explicit synchronous/asynchronous dependencies and failure budgets. State and reliability analysis for S23 - xt-audit-service: dependencies distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

BOUNDARY

Do not split into a service unless isolation or scaling adds value. Security analysis for S23 - xt-audit-service: boundary uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

OPERATIONAL EVIDENCE MATRIX

S23

Trigger	Name the condition that activates S23; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S23 - xt-audit-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S23 - xt-audit-service: State, Data and Consistency

STATE MODEL

xt-audit-service distinguishes durable state, cache, derived views and telemetry. Deployment analysis for S23 - xt-audit-service: state model has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

PERSISTENCE

Schema migrations, backups, retention and deletion are tested. Security analysis for S23 - xt-audit-service: persistence uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

FAILURE INJECTION

Restart, network partition, stale cache, duplicate delivery and corrupt record. Service contract for S23 - xt-audit-service: failure injection defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

xt-audit-service يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

CONSISTENCY

Declare ordering, concurrency, idempotency and conflict behavior. Deployment analysis for S23 - xt-audit-service: consistency has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

RECONCILIATION

Verify returned state before accepting audit report. Service contract for S23 - xt-audit-service: reconciliation defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

RECOVERY

Restore semantic correctness, not process uptime alone. Service contract for S23 - xt-audit-service: recovery defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S23

Trigger	Name the condition that activates S23; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S23 - xt-audit-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S23 - xt-audit-service: Security and Observability

IDENTITY

Scoped service identity and least-privilege access. State and reliability analysis for S23 - xt-audit-service: identity distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

SECRETS

Reference, rotate and audit secrets without logging values. Service contract for S23 - xt-audit-service: secrets defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

AUDIT

Link request, policy, mutation, postcondition and release version. Security analysis for S23 - xt-audit-service: audit uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

xt-audit-service يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INPUT DEFENSE

Schema validation, size limits, taint tracking and injection isolation. State and reliability analysis for S23 - xt-audit-service: input defense distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

OBSERVABILITY

Traces, metrics and logs cover coverage, unresolved critical defects and downstream failure. Security analysis for S23 - xt-audit-service: observability uses least privilege, scoped service identity, secret references, input validation, taint tracking, rate limits and audit. Untrusted data never becomes privileged instruction. Sensitive actions pause for T3 authority; prohibited T4 actions are blocked. Logs minimize payloads while preserving forensic identifiers.

INCIDENT RESPONSE

Alert only on actionable SLO or invariant breach. Service contract for S23 - xt-audit-service: incident response defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

OPERATIONAL EVIDENCE MATRIX

S23

Trigger	Name the condition that activates S23; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S23 - xt-audit-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

S23 - xt-audit-service: Testing, Deployment and Rollback

UNIT AND CONTRACT TESTS

Validate xt-audit-service schemas, properties and compatibility. State and reliability analysis for S23 - xt-audit-service: unit and contract tests distinguishes source of truth, cache, derived view and telemetry. Capture pre-state before mutation; reconcile authoritative returned state after action. Test restart, duplicate delivery, network partition, dependency latency, corrupted record and clock skew. Recovery objectives include both service availability and semantic correctness.

LOAD TESTS

Measure coverage, unresolved critical defects, saturation, queues and backpressure. Service contract for S23 - xt-audit-service: load tests defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

ROLLBACK

Rehearse application and data rollback; report residual state. Deployment analysis for S23 - xt-audit-service: rollback has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

xt-audit-service يحتاج source of truth وSLO وfailure path قبل اعتباره production service.

INTEGRATION TESTS

Exercise real dependencies, partial failures and cancellation. Service contract for S23 - xt-audit-service: integration tests defines endpoint or queue, schema version, authentication, authorization, idempotency, timeout, retry ceiling, concurrency, expected mutation and postcondition. Unknown fields and partial failures are explicit. The caller receives status, evidence pointers, cost and residual state. Compatibility is tested across adjacent versions.

CANARY

Promote a small cohort with comparison and rollback threshold. Deployment analysis for S23 - xt-audit-service: canary has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

RELEASE VERDICT

ADOPT, REVISE, HOLD or ROLLBACK based on evidence. Deployment analysis for S23 - xt-audit-service: release verdict has health, readiness, liveness, SLO, canary, rollback and ownership records. Observability covers latency distribution, saturation, error classes, cost, queue depth and downstream failures. A microservice split is retained only when isolation, scaling or ownership value exceeds operational complexity.

OPERATIONAL EVIDENCE MATRIX

S23

Trigger	Name the condition that activates S23; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by S23 - xt-audit-service.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M01 - HyperHarness: Theory, Model and Operational Contract

MECHANISM THESIS

HyperHarness: provider-neutral execution harness for models, agents, skills, tools, memory, policies and telemetry. Operational artifact: execution manifest. Mechanism specification for M01 - HyperHarness: mechanism thesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

STATE TRANSITION

Validate inputs -> apply HyperHarness -> emit execution manifest -> verify state. Mechanism specification for M01 - HyperHarness: state transition is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Integration design for M01 - HyperHarness: invariants declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

HyperHarness يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Evaluation design for M01 - HyperHarness: test trigger with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Integration design for M01 - HyperHarness: dependencies declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

METRICS

Measure portability, reproducibility, failure containment, cost, latency, calibration and recovery. Evaluation design for M01 - HyperHarness: test metrics with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M01

Trigger	Name the condition that activates M01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M01 - HyperHarness.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M01 - HyperHarness: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Mechanism specification for M01 - HyperHarness: null hypothesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Evaluation design for M01 - HyperHarness: test negative case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Integration design for M01 - HyperHarness: adversarial cases declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

HyperHarness يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where provider-neutral execution harness for models, agents, skills, tools, memory, policies and telemetry is the primary bottleneck. Mechanism specification for M01 - HyperHarness: positive case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Integration design for M01 - HyperHarness: ablations declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

PROMOTION

Advance only when portability, reproducibility, failure containment improves and evidence is reproducible. Integration design for M01 - HyperHarness: promotion declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M01

Trigger	Name the condition that activates M01; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M01 - HyperHarness.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M02 - FATTAH Six-Phase Reasoning Cortex: Theory, Model and Operational Contract

MECHANISM THESIS

FATTAH Six-Phase Reasoning Cortex: bounded recursive reasoning discipline that transforms mission state into tested action proposals. Operational artifact: FATTAH trace. Integration design for M02 - FATTAH Six-Phase Reasoning Cortex: mechanism thesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

STATE TRANSITION

Validate inputs -> apply FATTAH Six-Phase Reasoning Cortex -> emit FATTAH trace -> verify state. Integration design for M02 - FATTAH Six-Phase Reasoning Cortex: state transition declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Evaluation design for M02 - FATTAH Six-Phase Reasoning Cortex: test invariants with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

FATTAH Six-Phase Reasoning Cortex يبقى mechanism proposed حتى ينجو من transferو ablationو baseline.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Mechanism specification for M02 - FATTAH Six-Phase Reasoning Cortex: trigger is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Evaluation design for M02 - FATTAH Six-Phase Reasoning Cortex: test dependencies with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

METRICS

Measure convergence, decision quality, cost, cost, latency, calibration and recovery. Mechanism specification for M02 - FATTAH Six-Phase Reasoning Cortex: metrics is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M02

Trigger	Name the condition that activates M02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M02 - FATTAH Six-Phase Reasoning Cortex.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M02 - FATTAH Six-Phase Reasoning Cortex: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Integration design for M02 - FATTAH Six-Phase Reasoning Cortex: null hypothesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Mechanism specification for M02 - FATTAH Six-Phase Reasoning Cortex: negative case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Evaluation design for M02 - FATTAH Six-Phase Reasoning Cortex: test adversarial cases with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

FATTAH Six-Phase Reasoning Cortex يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where bounded recursive reasoning discipline that transforms mission state into tested action proposals is the primary bottleneck. Integration design for M02 - FATTAH Six-Phase Reasoning Cortex: positive case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Evaluation design for M02 - FATTAH Six-Phase Reasoning Cortex: test ablations with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

PROMOTION

Advance only when convergence, decision quality, cost improves and evidence is reproducible. Evaluation design for M02 - FATTAH Six-Phase Reasoning Cortex: test promotion with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M02

Trigger	Name the condition that activates M02; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M02 - FATTAH Six-Phase Reasoning Cortex.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M03 - MCD Causal-Difference Engine: Theory, Model and Operational Contract

MECHANISM THESIS

MCD Causal-Difference Engine: ranking of differences that can materially change route, judgment or world effect. Operational artifact: MCD ranking. Mechanism specification for M03 - MCD Causal-Difference Engine: mechanism thesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

STATE TRANSITION

Validate inputs -> apply MCD Causal-Difference Engine -> emit MCD ranking -> verify state. Mechanism specification for M03 - MCD Causal-Difference Engine: state transition is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Integration design for M03 - MCD Causal-Difference Engine: invariants declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

MCD Causal-Difference Engine يبقى mechanism proposed حتى ينجو من transfer وablation وbaseline.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Evaluation design for M03 - MCD Causal-Difference Engine: test trigger with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Integration design for M03 - MCD Causal-Difference Engine: dependencies declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

METRICS

Measure counterfactual impact, stability, cost, latency, calibration and recovery. Evaluation design for M03 - MCD Causal-Difference Engine: test metrics with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M03

Trigger	Name the condition that activates M03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M03 - MCD Causal-Difference Engine.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M03 - MCD Causal-Difference Engine: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Mechanism specification for M03 - MCD Causal-Difference Engine: null hypothesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Evaluation design for M03 - MCD Causal-Difference Engine: test negative case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Integration design for M03 - MCD Causal-Difference Engine: adversarial cases declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

MCD Causal-Difference Engine يبقى mechanism proposed حتى ينجو من transfer وablation وbaseline.

POSITIVE CASE

Construct a task where ranking of differences that can materially change route, judgment or world effect is the primary bottleneck. Mechanism specification for M03 - MCD Causal-Difference Engine: positive case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Integration design for M03 - MCD Causal-Difference Engine: ablations declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

PROMOTION

Advance only when counterfactual impact, stability improves and evidence is reproducible. Integration design for M03 - MCD Causal-Difference Engine: promotion declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX M03

Trigger	Name the condition that activates M03; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M03 - MCD Causal-Difference Engine.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M04 - OmniRoute: Theory, Model and Operational Contract

MECHANISM THESIS

OmniRoute: cross-capability router spanning model, skill, agent, tool and knowledge choices. Operational artifact: OmniRoute packet. Evaluation design for M04 - OmniRoute: test mechanism thesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

STATE TRANSITION

Validate inputs -> apply OmniRoute -> emit OmniRoute packet -> verify state. Evaluation design for M04 - OmniRoute: test state transition with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Mechanism specification for M04 - OmniRoute: invariants is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OmniRoute يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Integration design for M04 - OmniRoute: trigger declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Mechanism specification for M04 - OmniRoute: dependencies is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

METRICS

Measure route quality, fallback success, cost, latency, calibration and recovery. Integration design for M04 - OmniRoute: metrics declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M04

Trigger	Name the condition that activates M04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M04 - OmniRoute.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M04 - OmniRoute: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Evaluation design for M04 - OmniRoute: test null hypothesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Integration design for M04 - OmniRoute: negative case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Mechanism specification for M04 - OmniRoute: adversarial cases is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ablation و baseline حتى ينجو من mechanism proposed يبقى OmniRoute
.transfer و

POSITIVE CASE

Construct a task where cross-capability router spanning model, skill, agent, tool and knowledge choices is the primary bottleneck. Evaluation design for M04 - OmniRoute: test positive case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Mechanism specification for M04 - OmniRoute: ablations is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

PROMOTION

Advance only when route quality, fallback success improves and evidence is reproducible. Mechanism specification for M04 - OmniRoute: promotion is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M04

Trigger	Name the condition that activates M04; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M04 - OmniRoute.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M05 - Sparse HyperRouting: Theory, Model and Operational Contract

MECHANISM THESIS

Sparse HyperRouting: smallest-sufficient capability selection with evidence-based escalation. Operational artifact: sparse route. Mechanism specification for M05 - Sparse HyperRouting: mechanism thesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

STATE TRANSITION

Validate inputs -> apply Sparse HyperRouting -> emit sparse route -> verify state. Mechanism specification for M05 - Sparse HyperRouting: state transition is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Integration design for M05 - Sparse HyperRouting: invariants declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

Sparse HyperRouting يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Evaluation design for M05 - Sparse HyperRouting: test trigger with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Integration design for M05 - Sparse HyperRouting: dependencies declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

METRICS

Measure quality per token, activation precision, cost, latency, calibration and recovery. Evaluation design for M05 - Sparse HyperRouting: test metrics with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M05

Trigger	Name the condition that activates M05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M05 - Sparse HyperRouting.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M05 - Sparse HyperRouting: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Mechanism specification for M05 - Sparse HyperRouting: null hypothesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Evaluation design for M05 - Sparse HyperRouting: test negative case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Integration design for M05 - Sparse HyperRouting: adversarial cases declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

حتى ينجو من baseline يبقى mechanism proposed Sparse HyperRouting وablation وtransfer.

POSITIVE CASE

Construct a task where smallest-sufficient capability selection with evidence-based escalation is the primary bottleneck. Mechanism specification for M05 - Sparse HyperRouting: positive case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Integration design for M05 - Sparse HyperRouting: ablations declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

PROMOTION

Advance only when quality per token, activation precision improves and evidence is reproducible. Integration design for M05 - Sparse HyperRouting: promotion declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M05

Trigger	Name the condition that activates M05; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M05 - Sparse HyperRouting.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M06 - Five-Kernel Mesh: Theory, Model and Operational Contract

MECHANISM THESIS

Five-Kernel Mesh: K1-Hermes, K2-OpenCode, K3-Codex, K4-Claude and K5-Antigravity as a governed portfolio. Operational artifact: kernel dispatch plan. Evaluation design for M06 - Five-Kernel Mesh: test mechanism thesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

STATE TRANSITION

Validate inputs -> apply Five-Kernel Mesh -> emit kernel dispatch plan -> verify state. Evaluation design for M06 - Five-Kernel Mesh: test state transition with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Mechanism specification for M06 - Five-Kernel Mesh: invariants is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

Five-Kernel Mesh يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Integration design for M06 - Five-Kernel Mesh: trigger declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Mechanism specification for M06 - Five-Kernel Mesh: dependencies is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

METRICS

Measure diversity gain, correlated failure, cost, cost, latency, calibration and recovery. Integration design for M06 - Five-Kernel Mesh: metrics declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M06

Trigger	Name the condition that activates M06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M06 - Five-Kernel Mesh.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M06 - Five-Kernel Mesh: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Evaluation design for M06 - Five-Kernel Mesh: test null hypothesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Integration design for M06 - Five-Kernel Mesh: negative case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Mechanism specification for M06 - Five-Kernel Mesh: adversarial cases is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

Five-Kernel Mesh يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where K1-Hermes, K2-OpenCode, K3-Codex, K4-Claude and K5-Antigravity as a governed portfolio is the primary bottleneck. Evaluation design for M06 - Five-Kernel Mesh: test positive case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Mechanism specification for M06 - Five-Kernel Mesh: ablations is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

PROMOTION

Advance only when diversity gain, correlated failure, cost improves and evidence is reproducible. Mechanism specification for M06 - Five-Kernel Mesh: promotion is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M06

Trigger	Name the condition that activates M06; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M06 - Five-Kernel Mesh.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M07 - Model Capability Portfolio: Theory, Model and Operational Contract

MECHANISM THESIS

Model Capability Portfolio: profiled models selected by task, risk, privacy, latency and evidence needs. Operational artifact: model selection record. Integration design for M07 - Model Capability Portfolio: mechanism thesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

STATE TRANSITION

Validate inputs -> apply Model Capability Portfolio -> emit model selection record -> verify state. Integration design for M07 - Model Capability Portfolio: state transition declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Evaluation design for M07 - Model Capability Portfolio: test invariants with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

Model Capability Portfolio يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Mechanism specification for M07 - Model Capability Portfolio: trigger is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Evaluation design for M07 - Model Capability Portfolio: test dependencies with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

METRICS

Measure calibration, failover, cost, cost, latency, calibration and recovery. Mechanism specification for M07 - Model Capability Portfolio: metrics is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M07

Trigger	Name the condition that activates M07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M07 - Model Capability Portfolio.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M07 - Model Capability Portfolio: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Integration design for M07 - Model Capability Portfolio: null hypothesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Mechanism specification for M07 - Model Capability Portfolio: negative case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Evaluation design for M07 - Model Capability Portfolio: test adversarial cases with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

Model Capability Portfolio يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where profiled models selected by task, risk, privacy, latency and evidence needs is the primary bottleneck. Integration design for M07 - Model Capability Portfolio: positive case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Evaluation design for M07 - Model Capability Portfolio: test ablations with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

PROMOTION

Advance only when calibration, failover, cost improves and evidence is reproducible. Evaluation design for M07 - Model Capability Portfolio: test promotion with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M07

Trigger	Name the condition that activates M07; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M07 - Model Capability Portfolio.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M08 - T0-T4 Authorization Gates: Theory, Model and Operational Contract

MECHANISM THESIS

T0-T4 Authorization Gates: reasoning, read/create, reversible mutation, sensitive side effect and prohibited action tiers. Operational artifact: authorization verdict. Evaluation design for M08 - T0-T4 Authorization Gates: test mechanism thesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

STATE TRANSITION

Validate inputs -> apply T0-T4 Authorization Gates -> emit authorization verdict -> verify state. Evaluation design for M08 - T0-T4 Authorization Gates: test state transition with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Mechanism specification for M08 - T0-T4 Authorization Gates: invariants is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

T0-T4 Authorization Gates يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Integration design for M08 - T0-T4 Authorization Gates: trigger declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Mechanism specification for M08 - T0-T4 Authorization Gates: dependencies is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

METRICS

Measure unsafe action, false block, cost, latency, calibration and recovery. Integration design for M08 - T0-T4 Authorization Gates: metrics declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M08

Trigger	Name the condition that activates M08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M08 - T0-T4 Authorization Gates.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M08 - T0-T4 Authorization Gates: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Evaluation design for M08 - T0-T4 Authorization Gates: test null hypothesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Integration design for M08 - T0-T4 Authorization Gates: negative case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Mechanism specification for M08 - T0-T4 Authorization Gates: adversarial cases is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

T0-T4 Authorization Gates يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where reasoning, read/create, reversible mutation, sensitive side effect and prohibited action tiers is the primary bottleneck. Evaluation design for M08 - T0-T4 Authorization Gates: test positive case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Mechanism specification for M08 - T0-T4 Authorization Gates: ablations is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

PROMOTION

Advance only when unsafe action, false block improves and evidence is reproducible. Mechanism specification for M08 - T0-T4 Authorization Gates: promotion is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M08

Trigger	Name the condition that activates M08; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M08 - T0-T4 Authorization Gates.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M09 - E0-E5 Evidence Ladder: Theory, Model and Operational Contract

MECHANISM THESIS

E0-E5 Evidence Ladder: status progression from idea to independently replicated support. Operational artifact: evidence grade. Integration design for M09 - E0-E5 Evidence Ladder: mechanism thesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

STATE TRANSITION

Validate inputs -> apply E0-E5 Evidence Ladder -> emit evidence grade -> verify state. Integration design for M09 - E0-E5 Evidence Ladder: state transition declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Evaluation design for M09 - E0-E5 Evidence Ladder: test invariants with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

E0-E5 Evidence Ladder يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Mechanism specification for M09 - E0-E5 Evidence Ladder: trigger is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Evaluation design for M09 - E0-E5 Evidence Ladder: test dependencies with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

METRICS

Measure calibration, claim discipline, cost, latency, calibration and recovery. Mechanism specification for M09 - E0-E5 Evidence Ladder: metrics is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M09

Trigger	Name the condition that activates M09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M09 - E0-E5 Evidence Ladder.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M09 - E0-E5 Evidence Ladder: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Integration design for M09 - E0-E5 Evidence Ladder: null hypothesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Mechanism specification for M09 - E0-E5 Evidence Ladder: negative case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Evaluation design for M09 - E0-E5 Evidence Ladder: test adversarial cases with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

E0-E5 Evidence Ladder يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where status progression from idea to independently replicated support is the primary bottleneck. Integration design for M09 - E0-E5 Evidence Ladder: positive case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Evaluation design for M09 - E0-E5 Evidence Ladder: test ablations with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

PROMOTION

Advance only when calibration, claim discipline improves and evidence is reproducible. Evaluation design for M09 - E0-E5 Evidence Ladder: test promotion with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M09

Trigger	Name the condition that activates M09; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M09 - E0-E5 Evidence Ladder.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M10 - Goal Contract and CTP: Theory, Model and Operational Contract

MECHANISM THESIS

Goal Contract and CTP: typed objective, outputs, evidence, budget, authority and stop conditions. Operational artifact: goal contract. Evaluation design for M10 - Goal Contract and CTP: test mechanism thesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

STATE TRANSITION

Validate inputs -> apply Goal Contract and CTP -> emit goal contract -> verify state. Evaluation design for M10 - Goal Contract and CTP: test state transition with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Mechanism specification for M10 - Goal Contract and CTP: invariants is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

Goal Contract and CTP يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Integration design for M10 - Goal Contract and CTP: trigger declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Mechanism specification for M10 - Goal Contract and CTP: dependencies is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

METRICS

Measure scope drift, acceptance clarity, cost, latency, calibration and recovery. Integration design for M10 - Goal Contract and CTP: metrics declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M10

Trigger	Name the condition that activates M10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M10 - Goal Contract and CTP.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M10 - Goal Contract and CTP: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Evaluation design for M10 - Goal Contract and CTP: test null hypothesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Integration design for M10 - Goal Contract and CTP: negative case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Mechanism specification for M10 - Goal Contract and CTP: adversarial cases is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

baseline حتى ينجو من mechanism proposed يبقى Goal Contract and CTP
ablation وtransfer.

POSITIVE CASE

Construct a task where typed objective, outputs, evidence, budget, authority and stop conditions is the primary bottleneck. Evaluation design for M10 - Goal Contract and CTP: test positive case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Mechanism specification for M10 - Goal Contract and CTP: ablations is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

PROMOTION

Advance only when scope drift, acceptance clarity improves and evidence is reproducible. Mechanism specification for M10 - Goal Contract and CTP: promotion is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX M10

Trigger	Name the condition that activates M10; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M10 - Goal Contract and CTP.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M11 - Mission Plan DAG: Theory, Model and Operational Contract

MECHANISM THESIS

Mission Plan DAG: dependency-aware plan with parallel branches, checkpoints and rollback edges. Operational artifact: mission DAG. Integration design for M11 - Mission Plan DAG: mechanism thesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

STATE TRANSITION

Validate inputs -> apply Mission Plan DAG -> emit mission DAG -> verify state. Integration design for M11 - Mission Plan DAG: state transition declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Evaluation design for M11 - Mission Plan DAG: test invariants with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

Mission Plan DAG يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Mechanism specification for M11 - Mission Plan DAG: trigger is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Evaluation design for M11 - Mission Plan DAG: test dependencies with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

METRICS

Measure critical path, coordination loss, cost, latency, calibration and recovery. Mechanism specification for M11 - Mission Plan DAG: metrics is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M11

Trigger	Name the condition that activates M11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M11 - Mission Plan DAG.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M11 - Mission Plan DAG: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Integration design for M11 - Mission Plan DAG: null hypothesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Mechanism specification for M11 - Mission Plan DAG: negative case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Evaluation design for M11 - Mission Plan DAG: test adversarial cases with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

Mission Plan DAG يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where dependency-aware plan with parallel branches, checkpoints and rollback edges is the primary bottleneck. Integration design for M11 - Mission Plan DAG: positive case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Evaluation design for M11 - Mission Plan DAG: test ablations with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

PROMOTION

Advance only when critical path, coordination loss improves and evidence is reproducible. Evaluation design for M11 - Mission Plan DAG: test promotion with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M11

Trigger	Name the condition that activates M11; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M11 - Mission Plan DAG.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M12 - Planner-Executor-Verifier: Theory, Model and Operational Contract

MECHANISM THESIS

Planner-Executor-Verifier: separation of planning, action and independent acceptance. Operational artifact: PEV trace. Evaluation design for M12 - Planner-Executor-Verifier: test mechanism thesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

STATE TRANSITION

Validate inputs -> apply Planner-Executor-Verifier -> emit PEV trace -> verify state. Evaluation design for M12 - Planner-Executor-Verifier: test state transition with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Mechanism specification for M12 - Planner-Executor-Verifier: invariants is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

Planner-Executor-Verifier يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Integration design for M12 - Planner-Executor-Verifier: trigger declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Mechanism specification for M12 - Planner-Executor-Verifier: dependencies is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

METRICS

Measure defect recall, correlated failure, cost, latency, calibration and recovery. Integration design for M12 - Planner-Executor-Verifier: metrics declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M12

Trigger	Name the condition that activates M12; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M12 - Planner-Executor-Verifier.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M12 - Planner-Executor-Verifier: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Evaluation design for M12 - Planner-Executor-Verifier: test null hypothesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Integration design for M12 - Planner-Executor-Verifier: negative case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Mechanism specification for M12 - Planner-Executor-Verifier: adversarial cases is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

حتى ينجو من baseline يبقى mechanism proposed Planner-Executor-Verifier وablation وtransfer.

POSITIVE CASE

Construct a task where separation of planning, action and independent acceptance is the primary bottleneck. Evaluation design for M12 - Planner-Executor-Verifier: test positive case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Mechanism specification for M12 - Planner-Executor-Verifier: ablations is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

PROMOTION

Advance only when defect recall, correlated failure improves and evidence is reproducible. Mechanism specification for M12 - Planner-Executor-Verifier: promotion is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M12

Trigger	Name the condition that activates M12; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M12 - Planner-Executor-Verifier.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M13 - Agent Mesh: Theory, Model and Operational Contract

MECHANISM THESIS

Agent Mesh: specialist nodes with bounded missions, handoffs and merge governance. Operational artifact: agent mesh state. Evaluation design for M13 - Agent Mesh: test mechanism thesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

STATE TRANSITION

Validate inputs -> apply Agent Mesh -> emit agent mesh state -> verify state. Evaluation design for M13 - Agent Mesh: test state transition with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Mechanism specification for M13 - Agent Mesh: invariants is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

Agent Mesh يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Integration design for M13 - Agent Mesh: trigger declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Mechanism specification for M13 - Agent Mesh: dependencies is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

METRICS

Measure parallel gain, merge defects, cost, latency, calibration and recovery. Integration design for M13 - Agent Mesh: metrics declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M13

Trigger	Name the condition that activates M13; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M13 - Agent Mesh.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M13 - Agent Mesh: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Evaluation design for M13 - Agent Mesh: test null hypothesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Integration design for M13 - Agent Mesh: negative case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Mechanism specification for M13 - Agent Mesh: adversarial cases is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

Agent Mesh يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where specialist nodes with bounded missions, handoffs and merge governance is the primary bottleneck. Evaluation design for M13 - Agent Mesh: test positive case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Mechanism specification for M13 - Agent Mesh: ablations is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

PROMOTION

Advance only when parallel gain, merge defects improves and evidence is reproducible. Mechanism specification for M13 - Agent Mesh: promotion is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M13

Trigger	Name the condition that activates M13; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M13 - Agent Mesh.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M14 - HyperSkill Runtime: Theory, Model and Operational Contract

MECHANISM THESIS

HyperSkill Runtime: triggered, typed and independently testable reusable capability units. Operational artifact: skill activation record. Integration design for M14 - HyperSkill Runtime: mechanism thesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

STATE TRANSITION

Validate inputs -> apply HyperSkill Runtime -> emit skill activation record -> verify state. Integration design for M14 - HyperSkill Runtime: state transition declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Evaluation design for M14 - HyperSkill Runtime: test invariants with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

HyperSkill Runtime يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Mechanism specification for M14 - HyperSkill Runtime: trigger is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Evaluation design for M14 - HyperSkill Runtime: test dependencies with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

METRICS

Measure reuse, precision, regression, cost, latency, calibration and recovery. Mechanism specification for M14 - HyperSkill Runtime: metrics is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M14

Trigger	Name the condition that activates M14; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M14 - HyperSkill Runtime.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M14 - HyperSkill Runtime: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Integration design for M14 - HyperSkill Runtime: null hypothesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Mechanism specification for M14 - HyperSkill Runtime: negative case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Evaluation design for M14 - HyperSkill Runtime: test adversarial cases with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

HyperSkill Runtime يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where triggered, typed and independently testable reusable capability units is the primary bottleneck. Integration design for M14 - HyperSkill Runtime: positive case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Evaluation design for M14 - HyperSkill Runtime: test ablations with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

PROMOTION

Advance only when reuse, precision, regression improves and evidence is reproducible. Evaluation design for M14 - HyperSkill Runtime: test promotion with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M14

Trigger	Name the condition that activates M14; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M14 - HyperSkill Runtime.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M15 - HyperAbility Composition: Theory, Model and Operational Contract

MECHANISM THESIS

HyperAbility Composition: higher-order competence built from complementary skills and contracts. Operational artifact: ability plan. Mechanism specification for M15 - HyperAbility Composition: mechanism thesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

STATE TRANSITION

Validate inputs -> apply HyperAbility Composition -> emit ability plan -> verify state. Mechanism specification for M15 - HyperAbility Composition: state transition is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Integration design for M15 - HyperAbility Composition: invariants declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

HyperAbility Composition يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Evaluation design for M15 - HyperAbility Composition: test trigger with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Integration design for M15 - HyperAbility Composition: dependencies declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

METRICS

Measure composition gain, interface failure, cost, latency, calibration and recovery. Evaluation design for M15 - HyperAbility Composition: test metrics with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M15

Trigger	Name the condition that activates M15; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M15 - HyperAbility Composition.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M15 - HyperAbility Composition: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Mechanism specification for M15 - HyperAbility Composition: null hypothesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Evaluation design for M15 - HyperAbility Composition: test negative case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Integration design for M15 - HyperAbility Composition: adversarial cases declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

baseline حتى ينجو من mechanism proposed يبقى HyperAbility Composition وablation وtransfer.

POSITIVE CASE

Construct a task where higher-order competence built from complementary skills and contracts is the primary bottleneck. Mechanism specification for M15 - HyperAbility Composition: positive case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Integration design for M15 - HyperAbility Composition: ablations declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

PROMOTION

Advance only when composition gain, interface failure improves and evidence is reproducible. Integration design for M15 - HyperAbility Composition: promotion declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M15

Trigger	Name the condition that activates M15; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M15 - HyperAbility Composition.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M16 - Bounded HyperLoops and MCTS: Theory, Model and Operational Contract

MECHANISM THESIS

Bounded HyperLoops and MCTS: iterative search with budget, evidence-gain and stop predicates. Operational artifact: loop trajectory. Integration design for M16 - Bounded HyperLoops and MCTS: mechanism thesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

STATE TRANSITION

Validate inputs -> apply Bounded HyperLoops and MCTS -> emit loop trajectory -> verify state. Integration design for M16 - Bounded HyperLoops and MCTS: state transition declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Evaluation design for M16 - Bounded HyperLoops and MCTS: test invariants with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

Bounded HyperLoops and MCTS حتى ينجو من mechanism proposed يبقى
baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Mechanism specification for M16 - Bounded HyperLoops and MCTS: trigger is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Evaluation design for M16 - Bounded HyperLoops and MCTS: test dependencies with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

METRICS

Measure convergence, timeout, value per iteration, cost, latency, calibration and recovery. Mechanism specification for M16 - Bounded HyperLoops and MCTS: metrics is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M16

Trigger	Name the condition that activates M16; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M16 - Bounded HyperLoops and MCTS.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M16 - Bounded HyperLoops and MCTS: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Integration design for M16 - Bounded HyperLoops and MCTS: null hypothesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Mechanism specification for M16 - Bounded HyperLoops and MCTS: negative case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Evaluation design for M16 - Bounded HyperLoops and MCTS: test adversarial cases with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

Bounded HyperLoops and MCTS يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where iterative search with budget, evidence-gain and stop predicates is the primary bottleneck. Integration design for M16 - Bounded HyperLoops and MCTS: positive case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Evaluation design for M16 - Bounded HyperLoops and MCTS: test ablations with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

PROMOTION

Advance only when convergence, timeout, value per iteration improves and evidence is reproducible. Evaluation design for M16 - Bounded HyperLoops and MCTS: test promotion with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M16

Trigger	Name the condition that activates M16; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M16 - Bounded HyperLoops and MCTS.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M17 - HyperAgent Mission Contract: Theory, Model and Operational Contract

MECHANISM THESIS

HyperAgent Mission Contract: specialist agent identity, scope, tools, knowledge, output and acceptance criteria. Operational artifact: agent contract. Mechanism specification for M17 - HyperAgent Mission Contract: mechanism thesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

STATE TRANSITION

Validate inputs -> apply HyperAgent Mission Contract -> emit agent contract -> verify state. Mechanism specification for M17 - HyperAgent Mission Contract: state transition is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Integration design for M17 - HyperAgent Mission Contract: invariants declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

HyperAgent Mission Contract يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Evaluation design for M17 - HyperAgent Mission Contract: test trigger with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Integration design for M17 - HyperAgent Mission Contract: dependencies declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

METRICS

Measure scope adherence, handoff quality, cost, latency, calibration and recovery. Evaluation design for M17 - HyperAgent Mission Contract: test metrics with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M17

Trigger	Name the condition that activates M17; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M17 - HyperAgent Mission Contract.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M17 - HyperAgent Mission Contract: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Mechanism specification for M17 - HyperAgent Mission Contract: null hypothesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Evaluation design for M17 - HyperAgent Mission Contract: test negative case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Integration design for M17 - HyperAgent Mission Contract: adversarial cases declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

HyperAgent Mission Contract يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where specialist agent identity, scope, tools, knowledge, output and acceptance criteria is the primary bottleneck. Mechanism specification for M17 - HyperAgent Mission Contract: positive case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Integration design for M17 - HyperAgent Mission Contract: ablations declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

PROMOTION

Advance only when scope adherence, handoff quality improves and evidence is reproducible. Integration design for M17 - HyperAgent Mission Contract: promotion declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M17

Trigger	Name the condition that activates M17; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M17 - HyperAgent Mission Contract.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M18 - SQLite FTS5 and BM25 Substrate: Theory, Model and Operational Contract

MECHANISM THESIS

SQLite FTS5 and BM25 Substrate: exact retrieval for symbols, names, paths and lexical evidence. Operational artifact: lexical result set. Mechanism specification for M18 - SQLite FTS5 and BM25 Substrate: mechanism thesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

STATE TRANSITION

Validate inputs -> apply SQLite FTS5 and BM25 Substrate -> emit lexical result set -> verify state. Mechanism specification for M18 - SQLite FTS5 and BM25 Substrate: state transition is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Integration design for M18 - SQLite FTS5 and BM25 Substrate: invariants declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

SQLite FTS5 and BM25 Substrate يبقى mechanism proposed حتى ينجو من transfer وablation وbaseline.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Evaluation design for M18 - SQLite FTS5 and BM25 Substrate: test trigger with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Integration design for M18 - SQLite FTS5 and BM25 Substrate: dependencies declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

METRICS

Measure precision, latency, index health, cost, latency, calibration and recovery. Evaluation design for M18 - SQLite FTS5 and BM25 Substrate: test metrics with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M18

Trigger	Name the condition that activates M18; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M18 - SQLite FTS5 and BM25 Substrate.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M18 - SQLite FTS5 and BM25 Substrate: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Mechanism specification for M18 - SQLite FTS5 and BM25 Substrate: null hypothesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Evaluation design for M18 - SQLite FTS5 and BM25 Substrate: test negative case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Integration design for M18 - SQLite FTS5 and BM25 Substrate: adversarial cases declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

SQLite FTS5 and BM25 Substrate يبقى mechanism proposed حتى ينجو من transfer وablation وbaseline.

POSITIVE CASE

Construct a task where exact retrieval for symbols, names, paths and lexical evidence is the primary bottleneck. Mechanism specification for M18 - SQLite FTS5 and BM25 Substrate: positive case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Integration design for M18 - SQLite FTS5 and BM25 Substrate: ablations declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

PROMOTION

Advance only when precision, latency, index health improves and evidence is reproducible. Integration design for M18 - SQLite FTS5 and BM25 Substrate: promotion declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M18

Trigger	Name the condition that activates M18; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M18 - SQLite FTS5 and BM25 Substrate.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M19 - Dense 768d Vector Retrieval: Theory, Model and Operational Contract

MECHANISM THESIS

Dense 768d Vector Retrieval: semantic retrieval for conceptual similarity and paraphrase. Operational artifact: vector result set. Integration design for M19 - Dense 768d Vector Retrieval: mechanism thesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

STATE TRANSITION

Validate inputs -> apply Dense 768d Vector Retrieval -> emit vector result set -> verify state. Integration design for M19 - Dense 768d Vector Retrieval: state transition declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Evaluation design for M19 - Dense 768d Vector Retrieval: test invariants with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

Dense 768d Vector Retrieval يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Mechanism specification for M19 - Dense 768d Vector Retrieval: trigger is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Evaluation design for M19 - Dense 768d Vector Retrieval: test dependencies with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

METRICS

Measure semantic recall, drift, cost, latency, calibration and recovery. Mechanism specification for M19 - Dense 768d Vector Retrieval: metrics is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M19

Trigger	Name the condition that activates M19; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M19 - Dense 768d Vector Retrieval.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M19 - Dense 768d Vector Retrieval: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Integration design for M19 - Dense 768d Vector Retrieval: null hypothesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Mechanism specification for M19 - Dense 768d Vector Retrieval: negative case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Evaluation design for M19 - Dense 768d Vector Retrieval: test adversarial cases with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

baseline حتى ينجو من mechanism proposed Dense 768d Vector Retrieval يبقى
.transferو ablationو

POSITIVE CASE

Construct a task where semantic retrieval for conceptual similarity and paraphrase is the primary bottleneck. Integration design for M19 - Dense 768d Vector Retrieval: positive case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Evaluation design for M19 - Dense 768d Vector Retrieval: test ablations with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

PROMOTION

Advance only when semantic recall, drift improves and evidence is reproducible. Evaluation design for M19 - Dense 768d Vector Retrieval: test promotion with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M19

Trigger	Name the condition that activates M19; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M19 - Dense 768d Vector Retrieval.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M20 - Reciprocal Rank Fusion: Theory, Model and Operational Contract

MECHANISM THESIS

Reciprocal Rank Fusion: rank fusion across sparse and dense retrieval without incomparable raw scores. Operational artifact: fused ranking. Mechanism specification for M20 - Reciprocal Rank Fusion: mechanism thesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

STATE TRANSITION

Validate inputs -> apply Reciprocal Rank Fusion -> emit fused ranking -> verify state. Mechanism specification for M20 - Reciprocal Rank Fusion: state transition is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Integration design for M20 - Reciprocal Rank Fusion: invariants declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

Reciprocal Rank Fusion يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Evaluation design for M20 - Reciprocal Rank Fusion: test trigger with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Integration design for M20 - Reciprocal Rank Fusion: dependencies declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

METRICS

Measure NDCG, recall, robustness, cost, latency, calibration and recovery. Evaluation design for M20 - Reciprocal Rank Fusion: test metrics with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M20

Trigger	Name the condition that activates M20; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M20 - Reciprocal Rank Fusion.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M20 - Reciprocal Rank Fusion: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Mechanism specification for M20 - Reciprocal Rank Fusion: null hypothesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Evaluation design for M20 - Reciprocal Rank Fusion: test negative case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Integration design for M20 - Reciprocal Rank Fusion: adversarial cases declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

baseline حتى ينجو من mechanism proposed يبقى Reciprocal Rank Fusion وablation وtransfer.

POSITIVE CASE

Construct a task where rank fusion across sparse and dense retrieval without incomparable raw scores is the primary bottleneck. Mechanism specification for M20 - Reciprocal Rank Fusion: positive case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Integration design for M20 - Reciprocal Rank Fusion: ablations declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

PROMOTION

Advance only when NDCG, recall, robustness improves and evidence is reproducible. Integration design for M20 - Reciprocal Rank Fusion: promotion declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M20

Trigger	Name the condition that activates M20; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M20 - Reciprocal Rank Fusion.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M21 - GraphRAG and Context Genome: Theory, Model and Operational Contract

MECHANISM THESIS

GraphRAG and Context Genome: relationship-aware retrieval and context assembly across entities and projects. Operational artifact: graph context. Mechanism specification for M21 - GraphRAG and Context Genome: mechanism thesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

STATE TRANSITION

Validate inputs -> apply GraphRAG and Context Genome -> emit graph context -> verify state. Mechanism specification for M21 - GraphRAG and Context Genome: state transition is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Integration design for M21 - GraphRAG and Context Genome: invariants declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

GraphRAG and Context Genome يبقى mechanism proposed حتى ينجو من transfer وablation وbaseline.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Evaluation design for M21 - GraphRAG and Context Genome: test trigger with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Integration design for M21 - GraphRAG and Context Genome: dependencies declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

METRICS

Measure coverage, contradiction, token value, cost, latency, calibration and recovery. Evaluation design for M21 - GraphRAG and Context Genome: test metrics with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M21

Trigger	Name the condition that activates M21; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M21 - GraphRAG and Context Genome.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M21 - GraphRAG and Context Genome: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Mechanism specification for M21 - GraphRAG and Context Genome: null hypothesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Evaluation design for M21 - GraphRAG and Context Genome: test negative case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Integration design for M21 - GraphRAG and Context Genome: adversarial cases declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

GraphRAG and Context Genome يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where relationship-aware retrieval and context assembly across entities and projects is the primary bottleneck. Mechanism specification for M21 - GraphRAG and Context Genome: positive case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Integration design for M21 - GraphRAG and Context Genome: ablations declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

PROMOTION

Advance only when coverage, contradiction, token value improves and evidence is reproducible. Integration design for M21 - GraphRAG and Context Genome: promotion declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M21

Trigger	Name the condition that activates M21; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M21 - GraphRAG and Context Genome.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M22 - Context Capsules: Theory, Model and Operational Contract

MECHANISM THESIS

Context Capsules: bounded state packages for handoffs, continuity and compaction. Operational artifact: context capsule. Evaluation design for M22 - Context Capsules: test mechanism thesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

STATE TRANSITION

Validate inputs -> apply Context Capsules -> emit context capsule -> verify state. Evaluation design for M22 - Context Capsules: test state transition with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Mechanism specification for M22 - Context Capsules: invariants is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

Context Capsules يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Integration design for M22 - Context Capsules: trigger declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Mechanism specification for M22 - Context Capsules: dependencies is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

METRICS

Measure fidelity, handoff success, cost, latency, calibration and recovery. Integration design for M22 - Context Capsules: metrics declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M22

Trigger	Name the condition that activates M22; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M22 - Context Capsules.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M22 - Context Capsules: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Evaluation design for M22 - Context Capsules: test null hypothesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Integration design for M22 - Context Capsules: negative case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Mechanism specification for M22 - Context Capsules: adversarial cases is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

Context Capsules يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where bounded state packages for handoffs, continuity and compaction is the primary bottleneck. Evaluation design for M22 - Context Capsules: test positive case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Mechanism specification for M22 - Context Capsules: ablations is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

PROMOTION

Advance only when fidelity, handoff success improves and evidence is reproducible. Mechanism specification for M22 - Context Capsules: promotion is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M22

Trigger	Name the condition that activates M22; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M22 - Context Capsules.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M23 - Stratified and Self-Reconstruction Memory: Theory, Model and Operational Contract

MECHANISM THESIS

Stratified and Self-Reconstruction Memory: separate memory strata plus system-state reconstruction from validated records. Operational artifact: reconstruction packet. Integration design for M23 - Stratified and Self-Reconstruction Memory: mechanism thesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

STATE TRANSITION

Validate inputs -> apply Stratified and Self-Reconstruction Memory -> emit reconstruction packet -> verify state. Integration design for M23 - Stratified and Self-Reconstruction Memory: state transition declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Evaluation design for M23 - Stratified and Self-Reconstruction Memory: test invariants with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

حتى يبقى mechanism proposed Stratified and Self-Reconstruction Memory ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Mechanism specification for M23 - Stratified and Self-Reconstruction Memory: trigger is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Evaluation design for M23 - Stratified and Self-Reconstruction Memory: test dependencies with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

METRICS

Measure recovery fidelity, stale memory, cost, latency, calibration and recovery. Mechanism specification for M23 - Stratified and Self-Reconstruction Memory: metrics is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M23

Trigger	Name the condition that activates M23; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M23 - Stratified and Self-Reconstruction Memory.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M23 - Stratified and Self-Reconstruction Memory: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Integration design for M23 - Stratified and Self-Reconstruction Memory: null hypothesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Mechanism specification for M23 - Stratified and Self-Reconstruction Memory: negative case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Evaluation design for M23 - Stratified and Self-Reconstruction Memory: test adversarial cases with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

Stratified and Self-Reconstruction Memory يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where separate memory strata plus system-state reconstruction from validated records is the primary bottleneck. Integration design for M23 - Stratified and Self-Reconstruction Memory: positive case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Evaluation design for M23 - Stratified and Self-Reconstruction Memory: test ablations with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

PROMOTION

Advance only when recovery fidelity, stale memory improves and evidence is reproducible. Evaluation design for M23 - Stratified and Self-Reconstruction Memory: test promotion with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M23

Trigger	Name the condition that activates M23; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M23 - Stratified and Self-Reconstruction Memory.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M24 - MCP Server: Theory, Model and Operational Contract

MECHANISM THESIS

MCP Server: JSON-RPC stdio/SSE discovery and invocation of sovereign tools. Operational artifact: MCP call result. Integration design for M24 - MCP Server: mechanism thesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

STATE TRANSITION

Validate inputs -> apply MCP Server -> emit MCP call result -> verify state. Integration design for M24 - MCP Server: state transition declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Evaluation design for M24 - MCP Server: test invariants with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

MCP Server يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Mechanism specification for M24 - MCP Server: trigger is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Evaluation design for M24 - MCP Server: test dependencies with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

METRICS

Measure interoperability, tool success, cost, latency, calibration and recovery. Mechanism specification for M24 - MCP Server: metrics is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M24

Trigger	Name the condition that activates M24; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M24 - MCP Server.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M24 - MCP Server: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Integration design for M24 - MCP Server: null hypothesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Mechanism specification for M24 - MCP Server: negative case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Evaluation design for M24 - MCP Server: test adversarial cases with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

MCP Server يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where JSON-RPC stdio/SSE discovery and invocation of sovereign tools is the primary bottleneck. Integration design for M24 - MCP Server: positive case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Evaluation design for M24 - MCP Server: test ablations with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

PROMOTION

Advance only when interoperability, tool success improves and evidence is reproducible. Evaluation design for M24 - MCP Server: test promotion with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX M24

Trigger	Name the condition that activates M24; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M24 - MCP Server.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M25 - OpenAI-Compatible REST Gateway :8443: Theory, Model and Operational Contract

MECHANISM THESIS

OpenAI-Compatible REST Gateway :8443: /v1 interface for legacy clients and framework interoperability. Operational artifact: REST response. Mechanism specification for M25 - OpenAI-Compatible REST Gateway : mechanism thesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

STATE TRANSITION

Validate inputs -> apply OpenAI-Compatible REST Gateway :8443 -> emit REST response -> verify state. Mechanism specification for M25 - OpenAI-Compatible REST Gateway : state transition is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Integration design for M25 - OpenAI-Compatible REST Gateway : invariants declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OpenAI-Compatible REST Gateway :8443 يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Evaluation design for M25 - OpenAI-Compatible REST Gateway : test trigger with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Integration design for M25 - OpenAI-Compatible REST Gateway : dependencies declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

METRICS

Measure compatibility, latency, stream integrity, cost, latency, calibration and recovery. Evaluation design for M25 - OpenAI-Compatible REST Gateway : test metrics with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M25

Trigger	Name the condition that activates M25; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M25 - OpenAI-Compatible REST Gateway .	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M25 - OpenAI-Compatible REST Gateway :8443: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Mechanism specification for M25 - OpenAI-Compatible REST Gateway : null hypothesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Evaluation design for M25 - OpenAI-Compatible REST Gateway : test negative case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Integration design for M25 - OpenAI-Compatible REST Gateway : adversarial cases declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

حتى ينجو mechanism proposed يبقى OpenAI-Compatible REST Gateway :8443 من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where /v1 interface for legacy clients and framework interoperability is the primary bottleneck. Mechanism specification for M25 - OpenAI-Compatible REST Gateway : positive case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Integration design for M25 - OpenAI-Compatible REST Gateway : ablations declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

PROMOTION

Advance only when compatibility, latency, stream integrity improves and evidence is reproducible. Integration design for M25 - OpenAI-Compatible REST Gateway : promotion declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M25

Trigger	Name the condition that activates M25; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M25 - OpenAI-Compatible REST Gateway .	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M26 - Native CLI Bridge: Theory, Model and Operational Contract

MECHANISM THESIS

Native CLI Bridge: local deterministic command interface for operators and automation. Operational artifact: CLI execution record. Evaluation design for M26 - Native CLI Bridge: test mechanism thesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

STATE TRANSITION

Validate inputs -> apply Native CLI Bridge -> emit CLI execution record -> verify state. Evaluation design for M26 - Native CLI Bridge: test state transition with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Mechanism specification for M26 - Native CLI Bridge: invariants is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

Native CLI Bridge يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Integration design for M26 - Native CLI Bridge: trigger declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Mechanism specification for M26 - Native CLI Bridge: dependencies is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

METRICS

Measure exit correctness, scripting stability, cost, latency, calibration and recovery. Integration design for M26 - Native CLI Bridge: metrics declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M26

Trigger	Name the condition that activates M26; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M26 - Native CLI Bridge.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M26 - Native CLI Bridge: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Evaluation design for M26 - Native CLI Bridge: test null hypothesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Integration design for M26 - Native CLI Bridge: negative case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Mechanism specification for M26 - Native CLI Bridge: adversarial cases is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ablation وbaseline حتى ينجو من mechanism proposed يبقى Native CLI Bridge وtransfer.

POSITIVE CASE

Construct a task where local deterministic command interface for operators and automation is the primary bottleneck. Evaluation design for M26 - Native CLI Bridge: test positive case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Mechanism specification for M26 - Native CLI Bridge: ablations is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

PROMOTION

Advance only when exit correctness, scripting stability improves and evidence is reproducible. Mechanism specification for M26 - Native CLI Bridge: promotion is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX — M26

Trigger	Name the condition that activates M26; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M26 - Native CLI Bridge.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M27 - AST and Regex Sandbox Validation: Theory, Model and Operational Contract

MECHANISM THESIS

AST and Regex Sandbox Validation: static and pattern-based inspection before executable mutation. Operational artifact: sandbox verdict. Mechanism specification for M27 - AST and Regex Sandbox Validation: mechanism thesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

STATE TRANSITION

Validate inputs -> apply AST and Regex Sandbox Validation -> emit sandbox verdict -> verify state. Mechanism specification for M27 - AST and Regex Sandbox Validation: state transition is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Integration design for M27 - AST and Regex Sandbox Validation: invariants declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

AST and Regex Sandbox Validation يبقى mechanism proposed حتى ينجو من transfer وablation وbaseline.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Evaluation design for M27 - AST and Regex Sandbox Validation: test trigger with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Integration design for M27 - AST and Regex Sandbox Validation: dependencies declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

METRICS

Measure attack containment, false blocks, cost, latency, calibration and recovery. Evaluation design for M27 - AST and Regex Sandbox Validation: test metrics with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M27

Trigger	Name the condition that activates M27; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M27 - AST and Regex Sandbox Validation.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M27 - AST and Regex Sandbox Validation: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Mechanism specification for M27 - AST and Regex Sandbox Validation: null hypothesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Evaluation design for M27 - AST and Regex Sandbox Validation: test negative case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Integration design for M27 - AST and Regex Sandbox Validation: adversarial cases declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

AST and Regex Sandbox Validation يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where static and pattern-based inspection before executable mutation is the primary bottleneck. Mechanism specification for M27 - AST and Regex Sandbox Validation: positive case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Integration design for M27 - AST and Regex Sandbox Validation: ablations declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

PROMOTION

Advance only when attack containment, false blocks improves and evidence is reproducible. Integration design for M27 - AST and Regex Sandbox Validation: promotion declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M27

Trigger	Name the condition that activates M27; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M27 - AST and Regex Sandbox Validation.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M28 - Token-Bucket Rate Limiting: Theory, Model and Operational Contract

MECHANISM THESIS

Token-Bucket Rate Limiting: bounded request flow, backpressure and quota protection. Operational artifact: rate state. Mechanism specification for M28 - Token-Bucket Rate Limiting: mechanism thesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

STATE TRANSITION

Validate inputs -> apply Token-Bucket Rate Limiting -> emit rate state -> verify state. Mechanism specification for M28 - Token-Bucket Rate Limiting: state transition is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Integration design for M28 - Token-Bucket Rate Limiting: invariants declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

Token-Bucket Rate Limiting يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Evaluation design for M28 - Token-Bucket Rate Limiting: test trigger with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Integration design for M28 - Token-Bucket Rate Limiting: dependencies declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

METRICS

Measure throughput, retry amplification, cost, latency, calibration and recovery. Evaluation design for M28 - Token-Bucket Rate Limiting: test metrics with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M28

Trigger	Name the condition that activates M28; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M28 - Token-Bucket Rate Limiting.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M28 - Token-Bucket Rate Limiting: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Mechanism specification for M28 - Token-Bucket Rate Limiting: null hypothesis is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Evaluation design for M28 - Token-Bucket Rate Limiting: test negative case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Integration design for M28 - Token-Bucket Rate Limiting: adversarial cases declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

baseline حتى ينجو من mechanism proposed يبقى Token-Bucket Rate Limiting وablation وtransfer.

POSITIVE CASE

Construct a task where bounded request flow, backpressure and quota protection is the primary bottleneck. Mechanism specification for M28 - Token-Bucket Rate Limiting: positive case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Integration design for M28 - Token-Bucket Rate Limiting: ablations declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

PROMOTION

Advance only when throughput, retry amplification improves and evidence is reproducible. Integration design for M28 - Token-Bucket Rate Limiting: promotion declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M28

Trigger	Name the condition that activates M28; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M28 - Token-Bucket Rate Limiting.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M29 - Destruction and Falsification Courts: Theory, Model and Operational Contract

MECHANISM THESIS

Destruction and Falsification Courts: independent adversarial attempts to break artifacts and claims. Operational artifact: court verdict. Integration design for M29 - Destruction and Falsification Courts: mechanism thesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

STATE TRANSITION

Validate inputs -> apply Destruction and Falsification Courts -> emit court verdict -> verify state. Integration design for M29 - Destruction and Falsification Courts: state transition declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Evaluation design for M29 - Destruction and Falsification Courts: test invariants with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

Destruction and Falsification Courts يبقى mechanism proposed حتى ينجو من transfer وablation وbaseline.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Mechanism specification for M29 - Destruction and Falsification Courts: trigger is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Evaluation design for M29 - Destruction and Falsification Courts: test dependencies with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

METRICS

Measure critical defect discovery, independence, cost, latency, calibration and recovery. Mechanism specification for M29 - Destruction and Falsification Courts: metrics is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M29

Trigger	Name the condition that activates M29; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M29 - Destruction and Falsification Courts.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M29 - Destruction and Falsification Courts: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Integration design for M29 - Destruction and Falsification Courts: null hypothesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Mechanism specification for M29 - Destruction and Falsification Courts: negative case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Evaluation design for M29 - Destruction and Falsification Courts: test adversarial cases with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

Destruction and Falsification Courts يبقى mechanism proposed حتى ينجو من ablation وtransfer baseline.

POSITIVE CASE

Construct a task where independent adversarial attempts to break artifacts and claims is the primary bottleneck. Integration design for M29 - Destruction and Falsification Courts: positive case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Evaluation design for M29 - Destruction and Falsification Courts: test ablations with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

PROMOTION

Advance only when critical defect discovery, independence improves and evidence is reproducible. Evaluation design for M29 - Destruction and Falsification Courts: test promotion with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M29

Trigger	Name the condition that activates M29; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M29 - Destruction and Falsification Courts.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M30 - World-Effect Closure: Theory, Model and Operational Contract

MECHANISM THESIS

World-Effect Closure: proposal-to-action-to-returned-state-to-verification chain. Operational artifact: closure record. Integration design for M30 - World-Effect Closure: mechanism thesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

STATE TRANSITION

Validate inputs -> apply World-Effect Closure -> emit closure record -> verify state. Integration design for M30 - World-Effect Closure: state transition declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Evaluation design for M30 - World-Effect Closure: test invariants with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

baseline حتى ينجو من mechanism proposed يبقى World-Effect Closure
.transferو ablationو

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Mechanism specification for M30 - World-Effect Closure: trigger is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Evaluation design for M30 - World-Effect Closure: test dependencies with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

METRICS

Measure false success, closure latency, cost, latency, calibration and recovery. Mechanism specification for M30 - World-Effect Closure: metrics is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M30

Trigger	Name the condition that activates M30; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M30 - World-Effect Closure.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M30 - World-Effect Closure: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Integration design for M30 - World-Effect Closure: null hypothesis declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Mechanism specification for M30 - World-Effect Closure: negative case is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Evaluation design for M30 - World-Effect Closure: test adversarial cases with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

baseline حتى ينجو من mechanism proposed يبقى World-Effect Closure
وablation وtransfer.

POSITIVE CASE

Construct a task where proposal-to-action-to-returned-state-to-verification chain is the primary bottleneck. Integration design for M30 - World-Effect Closure: positive case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Evaluation design for M30 - World-Effect Closure: test ablations with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

PROMOTION

Advance only when false success, closure latency improves and evidence is reproducible. Evaluation design for M30 - World-Effect Closure: test promotion with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

OPERATIONAL EVIDENCE MATRIX

M30

Trigger	Name the condition that activates M30; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M30 - World-Effect Closure.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M31 - Four-Phase Self-Healing: Theory, Model and Operational Contract

MECHANISM THESIS

Four-Phase Self-Healing: detect, contain, repair and verify recovery under explicit authority. Operational artifact: healing trajectory. Evaluation design for M31 - Four-Phase Self-Healing: test mechanism thesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

STATE TRANSITION

Validate inputs -> apply Four-Phase Self-Healing -> emit healing trajectory -> verify state. Evaluation design for M31 - Four-Phase Self-Healing: test state transition with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Mechanism specification for M31 - Four-Phase Self-Healing: invariants is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

Four-Phase Self-Healing يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Integration design for M31 - Four-Phase Self-Healing: trigger declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Mechanism specification for M31 - Four-Phase Self-Healing: dependencies is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

METRICS

Measure RTO, recurrence, residual state, cost, latency, calibration and recovery. Integration design for M31 - Four-Phase Self-Healing: metrics declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M31

Trigger	Name the condition that activates M31; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M31 - Four-Phase Self-Healing.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M31 - Four-Phase Self-Healing: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Evaluation design for M31 - Four-Phase Self-Healing: test null hypothesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Integration design for M31 - Four-Phase Self-Healing: negative case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Mechanism specification for M31 - Four-Phase Self-Healing: adversarial cases is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

Four-Phase Self-Healing يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where detect, contain, repair and verify recovery under explicit authority is the primary bottleneck. Evaluation design for M31 - Four-Phase Self-Healing: test positive case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Mechanism specification for M31 - Four-Phase Self-Healing: ablations is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

PROMOTION

Advance only when RTO, recurrence, residual state improves and evidence is reproducible. Mechanism specification for M31 - Four-Phase Self-Healing: promotion is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M31

Trigger	Name the condition that activates M31; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M31 - Four-Phase Self-Healing.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M32 - Continual Learning with LoRA, SFT and DPO: Theory, Model and Operational Contract

MECHANISM THESIS

Continual Learning with LoRA, SFT and DPO: gated adaptation from curated traces, preferences and evaluation evidence. Operational artifact: learning release. Evaluation design for M32 - Continual Learning with LoRA, SFT and DPO: test mechanism thesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

STATE TRANSITION

Validate inputs -> apply Continual Learning with LoRA, SFT and DPO -> emit learning release -> verify state. Evaluation design for M32 - Continual Learning with LoRA, SFT and DPO: test state transition with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

INVARIANTS

No false success, hidden privilege escalation or unsupported claim. Mechanism specification for M32 - Continual Learning with LoRA, SFT and DPO: invariants is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

Continual Learning with LoRA, SFT and DPO يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

TRIGGER

Activate only when the mechanism addresses the governing bottleneck. Integration design for M32 - Continual Learning with LoRA, SFT and DPO: trigger declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

DEPENDENCIES

Declare layer, service, agent, model, knowledge and authority dependencies. Mechanism specification for M32 - Continual Learning with LoRA, SFT and DPO: dependencies is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

METRICS

Measure net gain, forgetting, rollback, cost, latency, calibration and recovery. Integration design for M32 - Continual Learning with LoRA, SFT and DPO: metrics declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

OPERATIONAL EVIDENCE MATRIX

M32

Trigger	Name the condition that activates M32; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M32 - Continual Learning with LoRA, SFT and DPO.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

M32 - Continual Learning with LoRA, SFT and DPO: Falsification, Benchmark and Promotion

NULL HYPOTHESIS

A simpler matched baseline performs equally without this mechanism. Evaluation design for M32 - Continual Learning with LoRA, SFT and DPO: test null hypothesis with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

NEGATIVE CASE

Construct a superficially similar task where activation adds no value. Integration design for M32 - Continual Learning with LoRA, SFT and DPO: negative case declares layer, service, agent, schema, authority and observability dependencies. Validate lossless handoff and semantic equivalence across CLI, MCP and REST where applicable. Partial execution and cancellation preserve residual state. Every external mutation requires world-effect reconciliation and a rollback or compensation path.

ADVERSARIAL CASES

Stale evidence, injection, partial tool failure, conflicting goals and resource pressure. Mechanism specification for M32 - Continual Learning with LoRA, SFT and DPO: adversarial cases is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

Continual Learning with LoRA, SFT and DPO يبقى mechanism proposed حتى ينجو من baseline وablation وtransfer.

POSITIVE CASE

Construct a task where gated adaptation from curated traces, preferences and evaluation evidence is the primary bottleneck. Evaluation design for M32 - Continual Learning with LoRA, SFT and DPO: test positive case with clean, ambiguous, adversarial, constrained, long-horizon and transfer cases. Match model, tools, knowledge, time and token budget. Measure correctness, calibration, cost, latency, safety, recovery and human correction. Include a negative activation case and a removal ablation. Evidence grade does not advance from documentation alone.

ABLATIONS

Remove, replace and vary dependencies; measure interaction effects. Mechanism specification for M32 - Continual Learning with LoRA, SFT and DPO: ablations is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

PROMOTION

Advance only when net gain, forgetting, rollback improves and evidence is reproducible. Mechanism specification for M32 - Continual Learning with LoRA, SFT and DPO: promotion is represented as an ordered transformation with typed inputs, state, decision rule, output and falsifier. Identify which simpler mechanism competes with it and what observation distinguishes them. The implementation exposes a disable switch and trace. If the named mechanism cannot predict a changed route or outcome, it remains a design metaphor.

OPERATIONAL EVIDENCE MATRIX

M32

Trigger	Name the condition that activates M32; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by M32 - Continual Learning with LoRA, SFT and DPO.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

XT Model Claim and Evidence Status

CORE RULE

Define whether each claim concerns architecture, code artifact, model weights, benchmark result, deployment or commercial packaging. Proposed research engineering is not validated AGI. Engineering discipline: core rule carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Engineering discipline: failure test carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. XT atlas interpretation: governance is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Engineering discipline: required artifact carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Engineering discipline: benchmark carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Research discipline: next action advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

OPERATIONAL EVIDENCE MATRIX

XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by XT Model Claim and Evidence Status.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Sparse Neural Core and External Cognition

CORE RULE

Study a compact neural core augmented by knowledge, memory, skills, tools and agents. Measure whether external structure improves capability without hiding model limitations. Engineering discipline: core rule carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Engineering discipline: failure test carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. XT atlas interpretation: governance is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

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Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Engineering discipline: required artifact carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Engineering discipline: benchmark carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Research discipline: next action advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

OPERATIONAL EVIDENCE MATRIX

XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Sparse Neural Core and External Cognition.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Active B≈96 / Total T≈1.2T Scaling Hypothesis

CORE RULE

Treat B and T as target architectural variables for sparse activation and external capacity, not as proof of trained parameter counts. Specify routing, storage and evaluation. Research discipline: core rule advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Research discipline: failure test advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Engineering discipline: governance carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Research discipline: required artifact advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Research discipline: benchmark advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. XT atlas interpretation: next action is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX — XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Active B≈96 / Total T≈1.2T Scaling Hypothesis.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Training Dataset Constitution

CORE RULE

Version SFT, DPO and trace datasets with provenance, licenses, privacy, quality filters, splits, contamination checks and deletion paths. Engineering discipline: core rule carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Engineering discipline: failure test carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. XT atlas interpretation: governance is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Engineering discipline: required artifact carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Engineering discipline: benchmark carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Research discipline: next action advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

OPERATIONAL EVIDENCE MATRIX — XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Training Dataset Constitution.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Supervised Fine-Tuning Program

CORE RULE

Train task and contract adherence through curated demonstrations; compare with prompting and retrieval baselines; measure transfer and catastrophic forgetting. XT atlas interpretation: core rule is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. XT atlas interpretation: failure test is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Research discipline: governance advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. XT atlas interpretation: required artifact is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. XT atlas interpretation: benchmark is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Engineering discipline: next action carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Supervised Fine-Tuning Program.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Preference and DPO Program

CORE RULE

Use preference pairs for helpfulness, constraint adherence and safe abstention; audit preference bias, annotator disagreement and reward hacking. XT atlas interpretation: core rule is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. XT atlas interpretation: failure test is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Research discipline: governance advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. XT atlas interpretation: required artifact is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. XT atlas interpretation: benchmark is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Engineering discipline: next action carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Preference and DPO Program.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

LoRA Adapter Lifecycle

CORE RULE

Create bounded adapters with base-model fingerprint, dataset lineage, evaluation pack, compatibility range, canary and rollback. XT atlas interpretation: core rule is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. XT atlas interpretation: failure test is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Research discipline: governance advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

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REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. XT atlas interpretation: required artifact is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. XT atlas interpretation: benchmark is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

NEXT ACTION

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OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by LoRA Adapter Lifecycle.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

vLLM Serving and Scheduler

CORE RULE

Specify batching, KV-cache, quantization, concurrency, timeout, rate limit and fallback behavior; measure throughput without masking tail latency. XT atlas interpretation: core rule is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. XT atlas interpretation: failure test is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Research discipline: governance advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

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REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. XT atlas interpretation: required artifact is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. XT atlas interpretation: benchmark is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Engineering discipline: next action carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

OPERATIONAL EVIDENCE MATRIX

XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by vLLM Serving and Scheduler.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Quantization: GGUF and AWQ

CORE RULE

Evaluate memory, speed and task-quality tradeoffs across precisions; include agentic tool use, long-context and calibration tests rather than perplexity alone. Research discipline: core rule advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Research discipline: failure test advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Engineering discipline: governance carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Research discipline: required artifact advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Research discipline: benchmark advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. XT atlas interpretation: next action is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Quantization.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Local Sovereign Deployment

CORE RULE

Package Windows/Linux local operation with explicit hardware envelopes, storage limits, offline behavior, secrets handling and recovery. XT atlas interpretation: core rule is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. XT atlas interpretation: failure test is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Research discipline: governance advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. XT atlas interpretation: required artifact is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. XT atlas interpretation: benchmark is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Engineering discipline: next action carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

OPERATIONAL EVIDENCE MATRIX

XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Local Sovereign Deployment.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Cloud and VPS Deployment

CORE RULE

Define container, network, TLS, proxy, persistence, scaling, backup, cost and incident responsibilities for hosted operation. Research discipline: core rule advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Research discipline: failure test advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Engineering discipline: governance carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Research discipline: required artifact advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Research discipline: benchmark advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. XT atlas interpretation: next action is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Cloud and VPS Deployment.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Docker Compose and Service Topology

CORE RULE

Start with the smallest service set; split only where isolation, scaling or ownership produces measured value; test startup order and partial failure. Research discipline: core rule advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Research discipline: failure test advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Engineering discipline: governance carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Research discipline: required artifact advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Research discipline: benchmark advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. XT atlas interpretation: next action is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Docker Compose and Service Topology.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

MCP, REST and Framework Interoperability

CORE RULE

Maintain one canonical capability contract across stdio/SSE MCP, REST :8443, CLI and adapters; test semantic equivalence and error mapping. XT atlas interpretation: core rule is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. XT atlas interpretation: failure test is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Research discipline: governance advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. XT atlas interpretation: required artifact is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. XT atlas interpretation: benchmark is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Engineering discipline: next action carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by MCP, REST and Framework Interoperability.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Authentication, Secrets and Session Security

CORE RULE

Use reference-based secrets, scoped identities, rotation, session isolation and audit. Never place keys in prompts, logs or generated artifacts. Research discipline: core rule advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Research discipline: failure test advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Engineering discipline: governance carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Research discipline: required artifact advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Research discipline: benchmark advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. XT atlas interpretation: next action is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Authentication, Secrets and Session Security.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Data Sovereignty and Retention

CORE RULE
Map data classes to storage, residency, purpose, encryption, retention, deletion and export behavior. Verify actual paths and backups. Engineering discipline: core rule carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

FAILURE TEST
Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Engineering discipline: failure test carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

GOVERNANCE
Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. XT atlas interpretation: governance is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT
Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Engineering discipline: required artifact carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

BENCHMARK
Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Engineering discipline: benchmark carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

NEXT ACTION
Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Research discipline: next action advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

OPERATIONAL EVIDENCE MATRIX — XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Data Sovereignty and Retention.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Threat Model and Red Team

CORE RULE

Cover prompt injection, tool abuse, path traversal, dependency compromise, model manipulation, data exfiltration, denial of service and insider risk. XT atlas interpretation: core rule is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. XT atlas interpretation: failure test is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Research discipline: governance advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. XT atlas interpretation: required artifact is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. XT atlas interpretation: benchmark is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Engineering discipline: next action carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Threat Model and Red Team.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Benchmark Suite v0.1

CORE RULE
Benchmark goal compilation, MCD, routing, retrieval, FATTAH, tools, agents, courts, world effect, memory and recovery under matched budgets. XT atlas interpretation: core rule is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

FAILURE TEST
Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. XT atlas interpretation: failure test is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

GOVERNANCE
Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Research discipline: governance advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT
Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. XT atlas interpretation: required artifact is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

BENCHMARK
Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. XT atlas interpretation: benchmark is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

NEXT ACTION
Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Engineering discipline: next action carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

OPERATIONAL EVIDENCE MATRIX — XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Benchmark Suite v0.1.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Ablation Matrix

CORE RULE

Remove every layer, service and mechanism separately; compare simpler configurations; reject components whose marginal value does not survive matched evaluation. Research discipline: core rule advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Research discipline: failure test advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Engineering discipline: governance carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Research discipline: required artifact advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Research discipline: benchmark advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. XT atlas interpretation: next action is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Ablation Matrix.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Cross-Model and Cross-Kernel Transfer

CORE RULE

Run the same contracts across K1-K5 and local models; measure portability, correlated failure, adapter burden and result stability. Engineering discipline: core rule carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Engineering discipline: failure test carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. XT atlas interpretation: governance is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Engineering discipline: required artifact carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Engineering discipline: benchmark carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Research discipline: next action advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

OPERATIONAL EVIDENCE MATRIX — XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Cross-Model and Cross-Kernel Transfer.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Performance and Cost Model

CORE RULE

Account for tokens, model latency, retrieval, coordination, tool calls, verification, storage and human intervention. Optimize value per total cost. XT atlas interpretation: core rule is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. XT atlas interpretation: failure test is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Research discipline: governance advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. XT atlas interpretation: required artifact is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. XT atlas interpretation: benchmark is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Engineering discipline: next action carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Performance and Cost Model.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Reliability and SLO Program

CORE RULE

Define availability, latency, correctness, freshness, tool success, false-success, recovery and audit SLOs with actionable error budgets. Research discipline: core rule advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Research discipline: failure test advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Engineering discipline: governance carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Research discipline: required artifact advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Research discipline: benchmark advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. XT atlas interpretation: next action is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX

XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Reliability and SLO Program.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Recovery, Checkpoint and Rollback

CORE RULE

Rehearse service failure, partial mutation, corrupted state, lost dependency and unsafe model output; verify recovery time and residual state. Research discipline: core rule advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Research discipline: failure test advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Engineering discipline: governance carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Research discipline: required artifact advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Research discipline: benchmark advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. XT atlas interpretation: next action is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Recovery, Checkpoint and Rollback.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Observability and Replay Ledger

CORE RULE

Link missions, routes, model versions, tool calls, costs, court verdicts, world effects and memory writes through stable IDs while minimizing sensitive logs. Engineering discipline: core rule carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Engineering discipline: failure test carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. XT atlas interpretation: governance is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Engineering discipline: required artifact carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Engineering discipline: benchmark carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Research discipline: next action advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

OPERATIONAL EVIDENCE MATRIX — XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Observability and Replay Ledger.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Provenance and Artifact Integrity

CORE RULE

Hash artifacts, pin versions, preserve source lineage and distinguish canonical, derived, mirror and historical files. Research discipline: core rule advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Research discipline: failure test advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Engineering discipline: governance carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Research discipline: required artifact advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Research discipline: benchmark advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. XT atlas interpretation: next action is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX

XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Provenance and Artifact Integrity.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Continual Learning Promotion Gate

CORE RULE

Stage every learning change; require benchmark improvement, safety review, canary, regression analysis and rollback before promotion. Research discipline: core rule advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Research discipline: failure test advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Engineering discipline: governance carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Research discipline: required artifact advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Research discipline: benchmark advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. XT atlas interpretation: next action is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX

XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Continual Learning Promotion Gate.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Skill Synthesis and Deduplication

CORE RULE

Compile only validated traces; compare semantic and behavioral similarity; merge duplicates without erasing edge-case differences. XT atlas interpretation: core rule is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. XT atlas interpretation: failure test is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Research discipline: governance advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. XT atlas interpretation: required artifact is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. XT atlas interpretation: benchmark is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Engineering discipline: next action carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

OPERATIONAL EVIDENCE MATRIX — XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Skill Synthesis and Deduplication.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Memory Consolidation and Forgetting

CORE RULE

Promote useful validated memory, expire stale context, preserve conflict, support deletion and measure whether memory changes outcomes. Research discipline: core rule advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Research discipline: failure test advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Engineering discipline: governance carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Research discipline: required artifact advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Research discipline: benchmark advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. XT atlas interpretation: next action is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Memory Consolidation and Forgetting.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

E0-E5 Research Evidence Ladder

CORE RULE

Move from idea to mechanism, prototype, controlled evidence, independent replication and robust support. Status language follows the evidence. Research discipline: core rule advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Research discipline: failure test advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Engineering discipline: governance carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Research discipline: required artifact advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Research discipline: benchmark advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. XT atlas interpretation: next action is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX

XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by E0-E5 Research Evidence Ladder.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Claims Discipline and Anti-Hype

CORE RULE

Do not use package size, agent count, fluent output or marketing copy as proof of AGI, sovereignty, zero hallucination or deterministic safety. XT atlas interpretation: core rule is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. XT atlas interpretation: failure test is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Research discipline: governance advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. XT atlas interpretation: required artifact is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. XT atlas interpretation: benchmark is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Engineering discipline: next action carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

OPERATIONAL EVIDENCE MATRIX — XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Claims Discipline and Anti-Hype.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Undeployed Layers and Gap Audit

CORE RULE

Track missing schemas, unconnected services, untested gates, absent benchmarks, simulated telemetry and unresolved authority or recovery paths. XT atlas interpretation: core rule is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. XT atlas interpretation: failure test is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Research discipline: governance advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. XT atlas interpretation: required artifact is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. XT atlas interpretation: benchmark is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Engineering discipline: next action carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Undeployed Layers and Gap Audit.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

vNext Roadmap

CORE RULE

Prioritize kernel completeness, minimal runnable slice, evidence ledger, benchmark pack, world-effect closure and recovery before expanding the swarm. Research discipline: core rule advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Research discipline: failure test advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Engineering discipline: governance carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Research discipline: required artifact advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Research discipline: benchmark advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. XT atlas interpretation: next action is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by vNext Roadmap.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Independent Collaboration and Replication

CORE RULE

Offer bounded hypotheses, schemas and benchmark tasks to external collaborators; seek falsification and replication rather than portfolio endorsement. Research discipline: core rule advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Research discipline: failure test advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Engineering discipline: governance carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Research discipline: required artifact advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Research discipline: benchmark advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. XT atlas interpretation: next action is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX — XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Independent Collaboration and Replication.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Publication and Artifact Program

CORE RULE

Separate architecture, systems, benchmark, security, human-agency and negative-results papers; release reproducible artifacts where authorized. Research discipline: core rule advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Research discipline: failure test advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. Engineering discipline: governance carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Research discipline: required artifact advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Research discipline: benchmark advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. XT atlas interpretation: next action is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Publication and Artifact Program.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet

Closing XT Kernel Constitution

CORE RULE

Preserve authority, compile goals, route sparsely, use typed tools, observe returned state, verify independently, commit or rollback, learn only validated memory and stop on risk. Engineering discipline: core rule carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

FAILURE TEST

Run negative activation, adversarial input, partial dependency, revoked authority and recovery scenarios. Engineering discipline: failure test carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

GOVERNANCE

Connect the decision to T0-T4, E0-E5, world-effect closure, audit and rollback. XT atlas interpretation: governance is tied to a claim, mechanism, artifact, test, evidence grade and release state. The registry distinguishes reported source figures, runnable local artifacts, benchmarked behavior and target architecture. A collaborator can challenge one bounded claim without endorsing the whole system.

الخلاصة: artifact + test + evidence + world effect؛ ما عدا ذلك يبقى target أو proposal.

REQUIRED ARTIFACT

Emit a versioned record with configuration, provenance, authority, evidence, metrics, status and residual uncertainty. Engineering discipline: required artifact carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

BENCHMARK

Compare matched simple, monolithic and full-kernel configurations; include cost and human correction. Engineering discipline: benchmark carries version, provenance, owner, authority, risk, cost, stop rule and rollback. Compare the simplest sufficient design and retain negative findings. Package size, agent count and fluent text do not substitute for evidence of capability, reliability or general intelligence.

NEXT ACTION

Define one bounded experiment, owner, artifact, acceptance threshold and publication status. Research discipline: next action advances through specification, prototype, controlled evaluation, ablation, transfer and independent replication. Publish configuration and limitations. When evidence is incomplete, status remains PROPOSED or HOLD; when the mechanism adds no marginal value, simplify, merge or reject it.

OPERATIONAL EVIDENCE MATRIX XT-SYNTHESIS

Trigger	Name the condition that activates XT-SYNTHESIS; reject unnecessary activation.	Negative case must route to the simpler baseline.	trigger + reason
Inputs	Goal, state, evidence, authority, budget, schema and version are explicit.	Missing or stale critical input produces HOLD.	input manifest
Object	Emit the typed artifact required by Closing XT Kernel Constitution.	Invalid schema or inert artifact fails the mechanism claim.	artifact + hash
Evidence	Attach provenance, grade, uncertainty and alternative explanations.	Counterevidence and source conflict remain visible.	claim ledger
Authority	Check scope, privacy, reversibility and human approval at action time.	Revoked or ambiguous authority blocks mutation.	authority log
Baseline	Match model, tools, data, time and token budget; ablate the component.	No marginal gain leads to simplify, merge or reject.	ablation record
World effect	Declare expected delta, observe returned state and verify postcondition.	Intent or call issuance never proves external success.	state delta
Recovery	Define stop, rollback, residual state and validated memory write.	Failed reversal escalates with preserved evidence.	recovery packet