

Working Analytical Proposal:

**Structural Sustainability & Authority-Path Exercisability
Analysis**

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Abstract

This working proposal examines whether, in declared authority-bearing systems, accumulated realized consequences are associated with changes in later realization conditions. It does not assert that existing governance or sustainability frameworks are inadequate, nor that any specified feedback mechanism is universal.

Grounded in the Structural Topology of Intertemporal Consequence (STOIC, AE-REG-0056), this document applies a local five-condition conjunctive predicate— $\text{Exercisable}(a, c, t)$ —to distinguish topology-supported reachability from a bounded judgment of present exercisability at a Consequence Seam.

The document advances one proposed, unregistered Definition candidate: Structural Sustainability. Relative to a declared selector, horizon, and correspondence rule, it concerns preservation of exercisability in the selected required path-time set. The proposed definition is not a law, invariant, or Registry Metric.

By explicitly isolating this proposed concept from exogenous study machinery (including declared system boundaries, required-path selectors, state horizons, and the descriptive score $\mathcal{S}(H)$), this document provides a rigorous epistemic architecture for diagnosing structural depletion across complex human and autonomous systems without introducing ungoverned assumptions into the canonical corpus.

Keywords: Authority Engineering, Structural Sustainability, Path Exercisability, STOIC Feedback, Agentic Governance, Autonomous System Alignment, Corpus Review.

1. Purpose and Authority Boundary

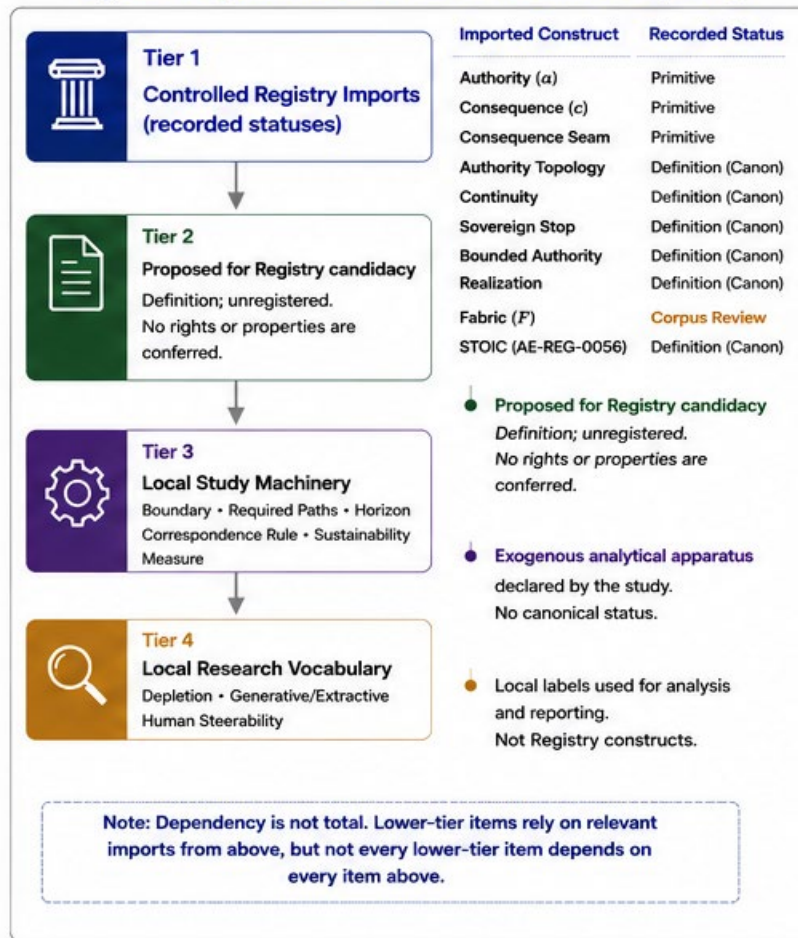
This working proposal consolidates exercisability analysis notation and technical-report research into a single document. It introduces a local derived predicate, a proposed Registry candidate definition for **Structural Sustainability**, and study machinery for evaluating whether declared Authority-to-Consequence relationships can be exercised at stated times. **It does not create or modify any primitive, Registry entry, governing law, metric, implementation requirement, document-control status, or authorization.**

The Authority Engineering Canon Registry remains the absolute source of truth for controlled terminology and status. The Constitution, Standard, and AE-METH-0001 govern classification, evidence, inference, and candidate admission workflows. This document organizes local hypotheses, derivations, study procedures, and illustrative models; **none becomes canonical merely by appearing here.**

2. Epistemic Architecture and Classification

In accordance with scientific corpus governance, the constructs within this document are strictly categorized across four distinct epistemic tiers:

Figure 1. Epistemic Governance Architecture (Draft)



Term / Construct	Governance Classification	Controlling Basis or Disposition
Authority, Consequence, Consequence Seam	Controlled Registry Import	AE-REG-0037, AE-REG-0038, AE-REG-0039; Primitive; Canon. Used verbatim.
Authority Topology, Continuity, Sovereign Stop, Bounded Authority Realization	Controlled Registry Import	AE-REG-0041, AE-REG-0043, AE-REG-0044, AE-REG-0047; Definition; Canon. Treat as defined terms, not proof of local hypotheses.

Term / Construct	Governance Classification	Controlling Basis or Disposition
Fabric	Controlled Registry Import	AE-REG-0051; Definition; Corpus Review. Retains review status; no stable interface, wire schema, or capability guarantee is assumed.
STOIC	Controlled Registry Import	AE-REG-0056; Definition; Canon. Analytical branch studying how accumulated consequence modifies future realization conditions. Not a law or proof of specific feedback mechanisms.
Authority-path exercisability	Local Derived Predicate	Defined in Section 3 from controlled imports. Composes 0037, 0038, 0039, 0041, 0043, 0044, 0051 via AE-AN-EX-0001. Not a Registry entry, metric, or control.
Structural Sustainability	Proposed Registry Candidate	Singular Proposed Definition (Unregistered). Proposed definition for systemic property; distinct from the machinery used to measure or observe it.
Required-path selector, declared boundary (Ω), declared purpose, State Horizon (H)	Local Study Machinery	Exogenous analytical inputs declared by the study or governing authority. Not corpus definitions.
Sustainability Measure ($\mathcal{S}(H)$)	Local Study Machinery	Local descriptive score designed to observe Structural Sustainability. Not a Registry Metric.

Term / Construct	Governance Classification	Controlling Basis or Disposition
Structural Depletion, Generative / Extractive Realization, Human Steerability	Local Research Vocabulary	Unregistered comparative labels and research subjects for analysis in this document. Not Registry Candidates.

3. Exercisability Analysis Notation

For a declared Authority a , Consequence c , and time t :

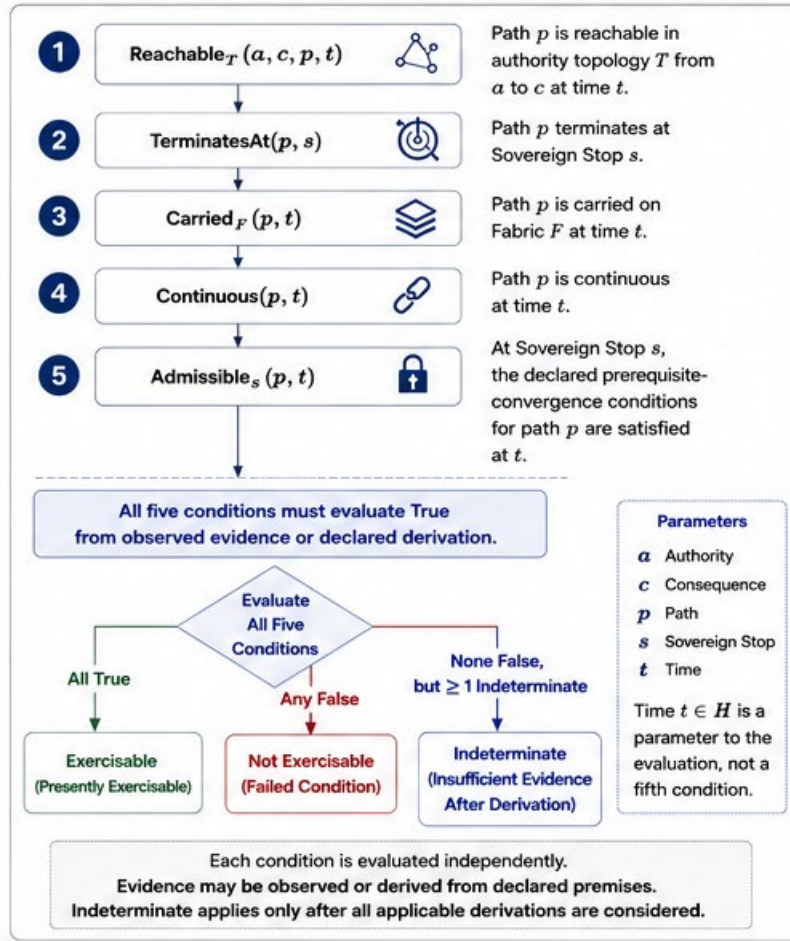
$$\text{Exercisable}(a, c, t) \Leftrightarrow \exists p, s \left[\begin{aligned} &\text{Reachable}_T(a, c, p, t) \\ &\wedge \text{TerminatesAt}(p, s) \\ &\wedge \text{Carried}_F(p, t) \\ &\wedge \text{Continuous}(p, t) \\ &\wedge \text{Admissible}_s(p, t) \end{aligned} \right]$$

Where:

- $\text{Reachable}_T(a, c, p, t)$ indicates that p is a topology-supported Authority-to-Consequence path at t ; **it is not evidence that the path can presently be used.**
- $\text{TerminatesAt}(p, s)$ identifies the Sovereign Stop s (AE-REG-0044) at which the applicable realization decision is locally determined.
- $\text{Carried}_F(p, t)$ indicates that the applicable Fabric F (AE-REG-0051, Corpus Review) can carry the authority-bearing, continuity-bearing, provenance-bearing, enforcement-bearing, or governance-bearing activity required by p at t .
- $\text{Continuous}(p, t)$ indicates that the Authority-Consequence relationship remains sufficiently preserved across traversal or mutation for a bounded realization judgment to be meaningful (AE-REG-0043).
- $\text{Admissible}_s(p, t)$ indicates that the locally authoritative Sovereign Stop s for the applicable Consequence Seam (AE-REG-0039) has satisfied its declared prerequisite-convergence conditions for p at t .

The predicate is strictly conjunctive. A topology-supported path alone does not establish present exercisability. The resulting judgment concerns a specific relationship and time; **it is neither synonymous with Authority nor evidence that consequence will occur.**

Figure 2. Authority–Path Exercisability Predicate (Local)



3.1 Evidence and Indeterminacy Treatment

For every application, the analyst shall declare the bounded a , c , p , s , system boundary, and time basis. Each conjunct shall be reported as observed, derived from declared premises, or indeterminate, with its evidence stated.

This proposal uses True, False, and Indeterminate ($\perp$) as local reporting outcomes:

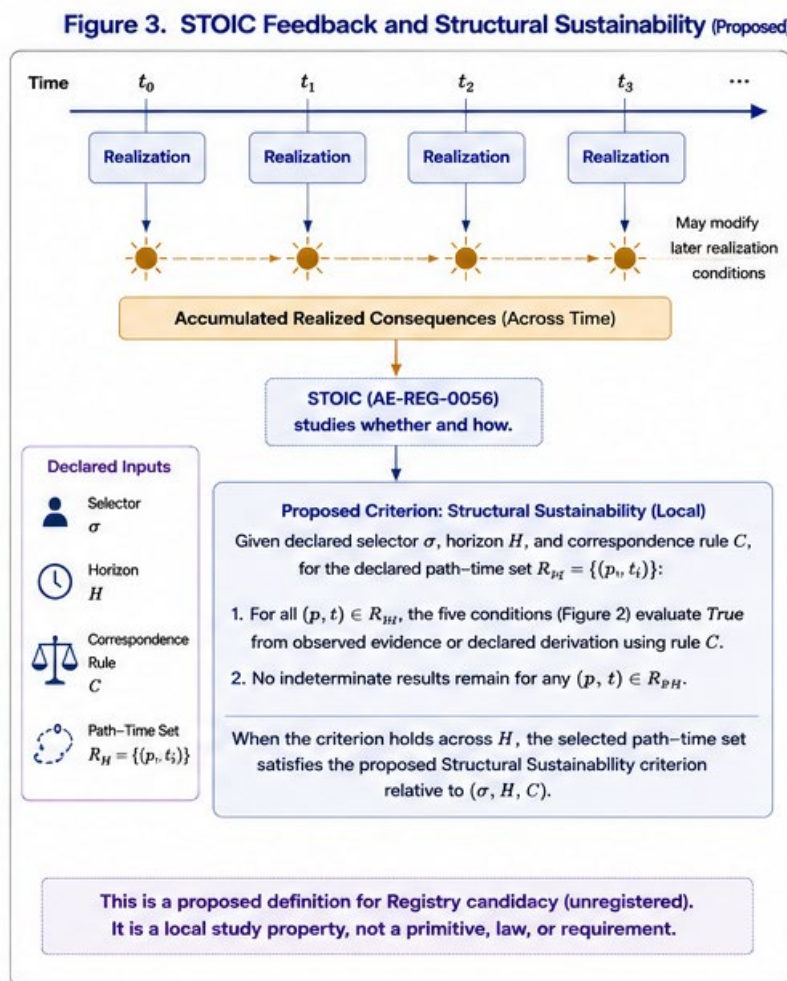
$$\forall \in \{\text{True}, \text{False}, \text{Indeterminate } (\perp)\}$$

- **Truth Value Rule:** $\text{Exercisable}(a, c, t) = \text{True}$ if and only if all five constituent conjuncts evaluate to True.
- **Indeterminate Rule:** A constituent conjunct evaluates to Indeterminate ($\perp$) when neither verifiable observation nor a declared derivation establishes its value. Missing observation alone is not evidence of False.

- **Non-Inference Rule:** A conclusion of False requires a declared basis for a failed conjunct. Missing observation alone **does not establish False**; it produces an Indeterminate conclusion unless stated premises support another result.

4. STOIC Alignment and Research Boundary

AE-REG-0056 (Structural Topology of Intertemporal Consequence) permits this proposal to study whether accumulated realized consequences change later realization conditions. **It does not establish that every attempted realization produces binding consequence, that every realized consequence changes Fabric, Continuity, or Stop conditions, or that any specified change is harmful.**



Accordingly, the following are research questions rather than canonical assertions:

1. After a declared sequence of realized consequences, do later exercisability assessments differ from the declared baseline?

2. If they differ, which observed or derived conditions—including Fabric carriage, Continuity, or Stop admissibility—account for the difference?
3. Can an explicit path-selection and measurement procedure distinguish a loss of present exercisability from incomplete observation?

5. Singular Proposed Candidate Definition & Local Study Design

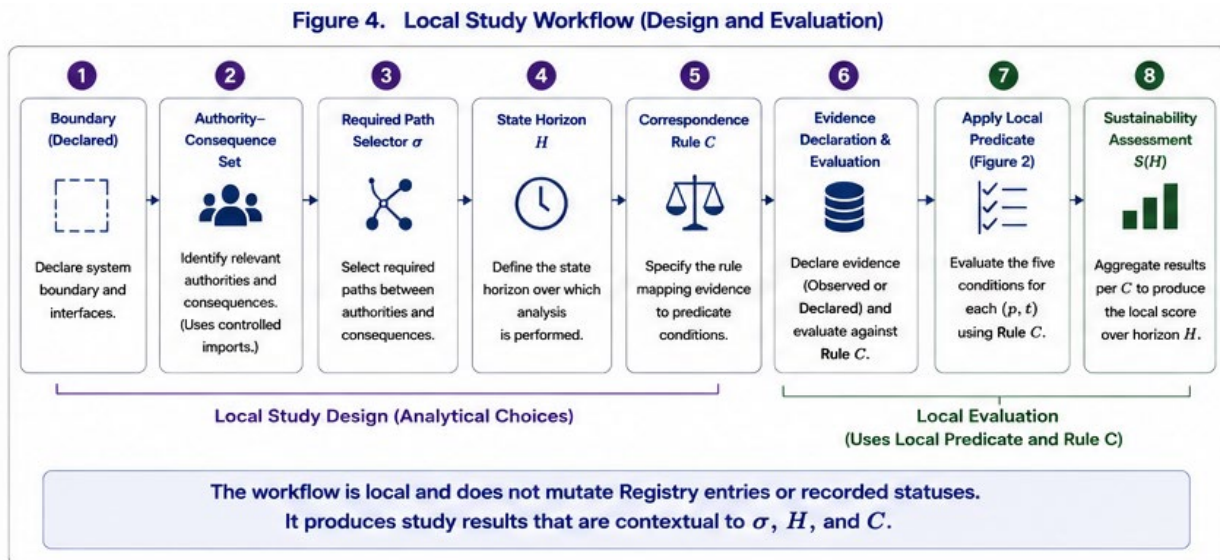
5.1 Proposed Registry Candidate (Definition; Unregistered)

This document elevates one core conceptual contribution for future Registry review:

Structural Sustainability (Proposed Definition): The structural property of an authority-bearing system wherein repeated realization of consequence preserves the future exercisability of the authority paths required for continued purposeful operation.

Governance Note: This candidate is proposed strictly as a **Definition**. It defines the conceptual property of interest. It does not establish a universal law, invariant, or Registry Metric.

5.2 Local Study Machinery (Exogenous Devices)



To observe and evaluate Structural Sustainability within a specific study, the analyst applies local machinery:

1. **Boundary (Ω)**: The local system boundary for the study.

2. **Authority and Consequence Set:** The in-scope a and c relationships across Consequence Seams.
3. **Required-Path Selector:** The exogenous rule, authority source, or policy mechanism that selects required paths $P_{\text{req}}(t)$ from topology-supported paths. *The selector is an external analytical input; a path is not corpus-defined as "required" merely because a local selector designates it.*
4. **State Horizon (H):** The finite sequence of evaluation times $H=[t_0, t_1, \dots, t_n]$ over which realized consequences and later realization conditions are assessed.
5. **Path Correspondence Rule:** The local rule mapping required paths to functional successors across state mutations.

5.3 Local Descriptive Score ($\mathcal{S}(H)$)

Let R_H be the declared set of path-time pairs selected for the horizon H . For each (p, t) in R_H , let s_p denote p 's declared terminating Sovereign Stop. The selected set is:

$$R_H = \{(p, t) \mid p \in P_{\text{req}}(t), t \in H\}$$

For each selected path-time pair, define the local five-condition conjunction:

$$E(a, c, p, t) \equiv [\text{Reachable}_T(a, c, p, t) \wedge \text{TerminatesAt}(p, s_p)]$$

$$\wedge [\text{Carried}_F(p, t) \wedge \text{Continuous}(p, t) \wedge \text{Admissible}_{(s_p)}(p, t)]$$

The local descriptive score is:

$$\mathcal{S}(H) = \frac{|\{(p, t) \in R_H : E(a, c, p, t) = \text{True}\}|}{|R_H|}$$

If the selected set is empty, or if any selected pair is indeterminate, the score is indeterminate:

$$\mathcal{S}(H) = \perp \text{ if } R_H = \emptyset \text{ or } \exists (p, t) \in R_H \text{ such that } E(a, c, p, t) = \perp$$

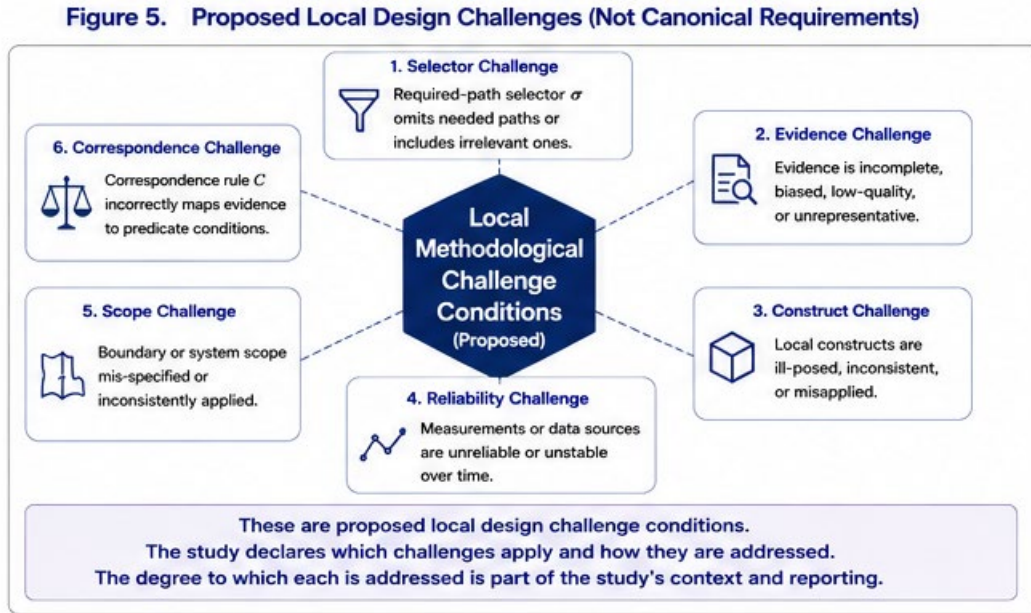
Limitation: This is a local descriptive measure for evaluating the proposed candidate definition within a declared study. It does not establish a Registry Metric, measure global topology breadth, or prove future reopenability.

5.4 Local Research Vocabulary

- **Generative Realization:** Comparative label for a realization associated with preserved or expanded local exercisability.
- **Extractive Realization:** Comparative label for a realization associated with reduced local exercisability.

- **Structural Depletion:** Local dynamic label describing repeated reductions in exercisability assessments across H .
- **Human Steerability:** Local research topic concerning the exercisability of human intervention paths.

6. Methodological Challenge Conditions



Consistent with AE-METH-0001, this proposal introduces six local design challenge conditions:

1. **Selector Challenge:** Qualified analysts applying the declared selector produce materially different P_{req} sets.
2. **Correspondence Challenge:** The path replacement rule cannot determine whether a successor preserves a selected path's declared role.
3. **Evidence Challenge:** Relevant records cannot distinguish an observed failed conjunct from an unobserved condition.
4. **Construct Challenge:** Complete predicate assessments do not bear the intended relationship to the declared study objective.
5. **Reliability Challenge:** Repeated application under comparable conditions produces inconsistent classifications or scores.
6. **Scope Challenge:** A cross-domain use changes the meaning of the selector, path correspondence, evidence, or score.

7. Illustrative, Non-Evidentiary Applications

All examples in Sections 7 and 8 are stipulated hypotheticals, not observations, validation cases, or scientific evidence. Each stipulates a declared (a, c, p, s, t) and, unless stated otherwise, $P_{req}(t) = \{p\}$ and the remaining predicate conditions are True under declared premises.

7.1 Unavailable Carriage (Fabric Unavailability)

- **Stipulation:** A topology-supported path p exists from declared a to c , terminating at Stop s , but applicable provenance Fabric (AE-REG-0051) is unavailable at t .
- **Result:** $Reachable_T = \text{True}$ and $Carried_F = \text{False}$. The derived judgment is $Exercisable(a, c, t) = \text{False}$.

7.2 Unmet Local Prerequisite

- **Stipulation:** Fabric is carried ($Carried_F = \text{True}$) and relationship is continuous ($Continuous = \text{True}$), but prerequisite convergence at Stop s has not occurred.
- **Result:** $Admissible_s = \text{False}$ or $\perp$. The derived judgment is not True.

7.3 Incomplete Observation (Telemetry Deficit)

- **Stipulation:** A topology-supported path exists, but no applicable evidence or declared premise exists for Fabric carriage.
- **Result:** The carriage condition and composite judgment must be recorded as Indeterminate ($\perp$) rather than inferring non-exercisability (False).

8. Non-Normative Multi-Domain Research Scenarios

8.1 Scenario A: Software Architecture (Coupling & Interface Mutation)

- **Boundary (Ω):** Transaction processing engine.
- **Realization Event:** Bypassing service abstractions to hardcode database triggers directly to hit an SLA metric.
- **STOIC Feedback:** Direct state mutations break semantic lineage across API boundaries ($Continuous = \text{False}$).

- **Exercisability Assessment:** Subsequent feature modification attempts fail because side-effects cannot be isolated. Path exercisability evaluates to $\text{Exercisable}(a, c, t_1) = \text{False}$.

8.2 Scenario B: Autonomous Cyber Defense (SOAR Policy Drift)

- **Boundary (Ω):** Active defense and identity infrastructure.
- **Realization Event:** Automated group-policy endpoint isolations executed to contain threat movement.
- **STOIC Feedback:** Suppressing atomic provenance logging causes access-control drift across identity Fabric (Corpus Review).
- **Exercisability Assessment:** Analysts cannot determine safe recovery states and issue a global override, disabling automated defense tools. Automated defense path exercisability evaluates to $\text{Exercisable}(a, c, t_1) = \text{False}$.

8.3 Scenario C: Agentic AI (Recursive Delegation Drift & Context Erosion)

- **Boundary (Ω):** Multi-agent autonomous workflow orchestration.
- **Realization Event:** An agentic planner recursively instantiates sub-agents to resolve API sub-tasks.
- **STOIC Feedback:** Re-summarizing system prompts strips out root safety rules, role boundaries, and audit parameters.
- **Exercisability Assessment:** Unforeseen sub-agent action occurs; human supervisors attempt emergency revocation, but lost governance context prevents token identification. Human emergency control path evaluates to $\text{Exercisable}(a, c, t_1) = \text{False}$.

9. Conclusion and Future Admission Boundary

This document contributes a local method for evaluating whether declared Authority-to-Consequence relationships are exercisable at stated times, alongside a single proposed candidate definition for **Structural Sustainability**.

The document does not establish structural sustainability, depletion, generative/extractive realization, human steerability, or $\mathcal{S}(H)$ as canonical Registry entries, laws, or metrics. Any future admission work must register the proposed Definition, state its dependencies, execute duplicate analysis, and fulfill applicable proof obligations before relying on the concept as a canonical corpus premise.

10. Governing References

- **Authority Engineering Constitution**, especially Articles I, IV, V, VI, and VIII.
- **Authority Engineering Standard**, especially statement treatment, evidence, falsification, and candidate workflow.
- **AE-METH-0001**, especially local vocabulary, observed versus inferred paths, local relevance criteria, measurement, uncertainty, and falsification requirements.
- **Authority Engineering Canon Registry**: AE-REG-0003, AE-REG-0004, AE-REG-0037 through AE-REG-0039, AE-REG-0041, AE-REG-0043, AE-REG-0044, AE-REG-0047, AE-REG-0050, AE-REG-0051, and AE-REG-0056.