

Volume 0

Internal Consistency Document

Canonical Symbols, Proof Sketches, Equivalence Briefs,
and the Master Claim Formalization

Flyxion Fifteen-Volume Curriculum — Pre-Publication Archive

Flyxion

June 2026

Not for distribution. For internal use only.

Purpose and Scope

Volume 0 is not part of the curriculum. It is the document that makes the curriculum possible to write without introducing contradictions. It has four components, each corresponding to one class of consistency problem that, if unresolved, will propagate errors across all fifteen volumes.

Chapter 1: Canonical Symbol Table. Every object in the corpus is assigned exactly one symbol. All collisions are resolved. No volume may introduce a symbol not listed here without amending this table first.

Chapter 2: Primitive Object Definitions. Every primitive object is formally defined. Objects that are derived from primitives are identified as such. No derived object is treated as primitive elsewhere in the corpus.

Chapter 3: Asserted Results and Proof Sketches. Every result in the corpus that is currently asserted without proof is stated precisely, assigned an epistemic status, and given a proof sketch, a proof strategy, or an explicit flag that it is a philosophical proposal requiring validation before the volume that uses it can be finalized.

Chapter 4: Equivalence Candidate Briefs. Each of the nine equivalence candidates identified in the Atlas is given a one-page formal argument establishing whether it is a genuine equivalence, a common parent structure, or a shared dynamical form.

Chapter 5: The Master Claim and Path-Action Transition. The Master Claim is formalized at two levels (state-functional and path-variational), the relationship between them is stated precisely, and the proof obligations for Volume XV are identified.

Rule: Writing on any of the fifteen volumes may not begin until this document has been reviewed and the items flagged as foundational risks have been addressed. A failed foundational result changes nearly every volume; a failed technical result changes one or two. Chapters 3 and 5 identify which is which.

Contents

Purpose and Scope	3
1 Canonical Symbol Table	7
1.1 Foundational Geometric Objects	7
1.2 Projection and Observation Objects	7
1.3 Trajectory and Path Objects	8
1.4 RSVP Field Objects	8
1.5 Operator Objects	9
1.6 Resolved Symbol Conflicts	9
2 Primitive Object Definitions	11
2.1 The Admissibility Structure	11
2.2 The Projection Structure	11
2.3 The Admissible Trajectory	12
2.4 The Path Lagrangian	12
2.5 The Repair Morphism (Provisional Definition)	12
3 Asserted Results and Proof Sketches	15
3.1 Volume I: Constraint Geometry	15
3.2 Volume II: RSVP Field Theory	16
3.3 Volume III: Projection and Inference	16
3.4 Volume VII: Spherepop	19
3.5 Volume X: Coordination Geometry	19
3.6 Foundational Results: High Priority	20
4 Equivalence Candidate Briefs	23
4.1 Candidate 1: The Admissibility Cluster	23
4.2 Candidate 2: The Projection Cluster	23
4.3 Candidate 3: The Tension / Free Energy Cluster	24
4.4 Candidate 4: The Collapse / Reconstruction Cluster	24
4.5 Candidate 5: The Reachability Cluster	25
4.6 Candidate 6: Cognitive Branch Sequence	25
4.7 Candidate 7: Repair Scale Hierarchy	25
4.8 Candidate 8: The Reachability Field	26
4.9 Candidate 9: The Energy Functor	26

5	The Master Claim and Path-Action Transition	29
5.1	Two Levels of the Master Claim	29
5.2	Relationship Between the Two Levels	29
5.3	The Five-Level Hierarchy	30
5.4	Proof Obligations for Volume XV	30
5.5	What the Path-Action Transition Changes	31
	Closing Note	33

Chapter 1

Canonical Symbol Table

Every symbol in this table is canonical. Where a legacy symbol conflicts with the canonical assignment, the legacy symbol is immediately retired for all new writing. Existing documents using legacy symbols must be updated before submission.

1.1. Foundational Geometric Objects

Concept	Symbol	Notes
State space	\mathcal{S}	Full space of all possible configurations. Not to be confused with the entropy field S .
Admissibility space	\mathcal{A}	Sub-manifold of \mathcal{S} where constraints are satisfied.
Admissibility metric	g	Fisher information metric on \mathcal{A} . In RSVP context, may be extended to g_{RSVP} .
Inadmissibility functional	\mathcal{I}	Non-negative functional; $\mathcal{I}(x) = 0 \iff x \in \mathcal{A}$. Not V , not F , not d^2 — those are domain-specific instances.
Reachability set	$R(x)$	Set of states reachable from x via admissible paths.
Reachability volume	$\Omega(x)$	$\text{Vol}(R(x))$. Measure of local future freedom.
Constraint family	$C = \{C_i\}$	$\mathcal{A} = \{x \mid C_i(x) \leq 0 \forall i\}$.

1.2. Projection and Observation Objects

Concept	Symbol	Notes
Projection (compression)	$\pi : X \rightarrow M$	Smooth surjective map from state space to observable manifold.

Fiber / preimage	$\pi^{-1}(m)$	States consistent with observation m . Epistemic object, not dynamical.
Section / reconstruction	$\sigma : M \rightarrow X$	Right inverse of π ; $\pi \circ \sigma = \text{id}_M$. Replaces \mathcal{R} for reconstruction direction to avoid collision with reachability.
General recovery operator	$\mathcal{Q} : M \rightarrow X$	Umbrella for all reconstruction operators (σ , ecphory, Collapse).
Observable manifold	M	Target of projection π .
Observation	$m \in M$	A single observation; $m = \pi(x)$ for some x .
Opacity	$\Omega_S + \Omega_M$	Structural (Ω_S) and manufactured (Ω_M) components. Not to be confused with reachability volume $\Omega(x)$; subscripts required when both appear together.

1.3. Trajectory and Path Objects

Concept	Symbol	Notes
Admissible trajectory	$\gamma : [0, T] \rightarrow \mathcal{A}$	Primary trajectory object; primitive from Volume IV onward.
Trajectory space	$\Gamma(\mathcal{A})$	Space of all admissible trajectories.
Path action	$\mathcal{J}[\gamma]$	$\int_0^T L(\gamma, \dot{\gamma}, t) dt$.
Path Lagrangian	L	$L : T\mathcal{A} \times [0, T] \rightarrow \mathbb{R}$. Defined on the tangent bundle of \mathcal{A} .
Extremal trajectory	γ^*	$\arg \text{ext}_{\gamma \in \Gamma(\mathcal{A})} \mathcal{J}[\gamma]$.
Repair path	γ_{rep}	Trajectory satisfying $d\Omega/dt > 0$ along its length.
Event history	$H_t = (e_1, \dots, e_n)$	MEM 8 discrete trajectory in event space; $H_t \in \Gamma_{\text{disc}}(\mathcal{A})$.

1.4. RSVP Field Objects

Concept	Symbol	Notes
Scalar field	Φ	Structural potential / salience / likelihood landscape.
Vector field	\mathbf{v}	Admissibility flow / information transport.

Entropy field	S	RSVP dynamical entropy; local accessibility density. Distinct from Shannon entropy H and path degradation σ_{deg} .
RSVP triple	$X = (\Phi, \mathbf{v}, S)$	Full field state.
Lamphron	λ^+ region	Local maximum of S ; accessibility source.
Lamphrodyne	λ^- region	Local minimum of S ; accessibility sink; site of structure formation.

1.5. Operator Objects

Concept	Symbol	Notes
Pop	Pop	Reduces local entropy at site exceeding threshold θ_P .
Bind	Bind	Joins causally compatible events.
Collapse	Collapse	Realization functor $F : \mathcal{H} \rightarrow \mathcal{C}$; state derived from history.
Refuse	Refuse	Principled exclusion with responsibility weight ρ_x .
Repair morphism	R_ϵ	Admissibility-preserving map reducing \mathcal{I} ; formal definition pending (see §3.9).
Ecphory operator	\mathcal{E}_{cph}	Wave-propagation retrieval; fires when activation exceeds threshold θ_E .
Lamphrodyne operator	\mathcal{L}_{lp}	Linear relaxation component of RSVP dynamics.
Energy functor	\mathfrak{T}	Maps frameworks to energy landscapes; see Chapter 5. Not \mathbb{T} (torus).

1.6. Resolved Symbol Conflicts

The following conflicts existed in the prior corpus. The canonical resolution is mandatory in all new and revised writing.

Concept	Retired symbols	Canonical	Reason
Entropy kinds)	(three S (all three uses)	S for RSVP field; H for Shannon; σ_{deg} for path degradation	Three genuinely different objects

Inadmissibility	V, F, d^2, \mathcal{O}	\mathcal{I} universally	Domain-specific names are instances
Reachability (set vs. volume)	$\Omega, \mathcal{F}_{\text{soc}}$ for same concept	$R(x)$ for set; $\Omega(x)$ for volume; \mathcal{F}_{soc} for social freedom	Prevents conflation
Reconstruction direction	\mathcal{R}, F, σ	σ for section; \mathcal{Q} for general recovery	\mathcal{R} collides with reachability
Free energy (Bayesian)	F, \mathcal{I}	F reserved for variational free energy in Bayesian contexts; \mathcal{I} for inadmissibility elsewhere	Prevents thermodynamic confusion
Energy functor	\mathbb{T}, \mathcal{I}	\mathfrak{I}	\mathbb{T} is the torus; \mathcal{I} is non-standard

Chapter 2

Primitive Object Definitions

This chapter defines every primitive object in the corpus. Derived objects are defined in terms of primitives and labeled as such. No derived object is to be treated as foundational elsewhere.

2.1. The Admissibility Structure

Definition 2.1 (Admissibility Structure). *An admissibility structure is a quadruple $(\mathcal{S}, \mathcal{A}, g, \mathcal{I})$ where:*

- \mathcal{S} is a smooth manifold (the state space).
- $\mathcal{A} \subseteq \mathcal{S}$ is a sub-manifold defined by $\mathcal{A} = \{x \in \mathcal{S} \mid C_i(x) \leq 0 \forall i \in I\}$ for a constraint family $\{C_i\}_{i \in I}$.
- g is a Riemannian metric on \mathcal{A} ; the canonical choice is the Fisher information metric $g_{jk} = \mathbb{E}[\partial_j \log p \partial_k \log p]$.
- $\mathcal{I} : \mathcal{S} \rightarrow \mathbb{R}_{\geq 0}$ is a smooth inadmissibility functional with $\mathcal{I}(x) = 0 \iff x \in \mathcal{A}$ and $\mathcal{I}(x) > 0$ otherwise.

Remark 2.2. The admissibility structure is the common parent of several objects that appear under different names across frameworks. These are *not* equivalent to each other; they are *derived from* the admissibility structure by additional specifications: $R(x) \subseteq \mathcal{A}$ (dynamical subobject), $\pi^{-1}(m) \subseteq X$ (epistemic subobject), \mathcal{P} in MEM|8 (historical subobject). See Chapter 4, Candidate 1.

2.2. The Projection Structure

Definition 2.3 (Projection Structure). *A projection structure is a triple (X, M, π) where X is a state space, M is an observable manifold, and $\pi : X \rightarrow M$ is a smooth surjective map (a projection or submersion). The fiber over $m \in M$ is $\pi^{-1}(m) = \{x \in X \mid \pi(x) = m\}$.*

Definition 2.4 (Operational Fiber Death). *A state $m \in M$ exhibits operational fiber death when $\pi^{-1}(m) \neq \emptyset$ but the measure of admissible reconstruction pathways satisfies $\mu(\mathcal{P}_m) \rightarrow 0$. That is: the preimage is non-empty in principle but unreachable in practice.*

2.3. The Admissible Trajectory

Definition 2.5 (Admissible Trajectory). *An admissible trajectory is a curve $\gamma : [0, T] \rightarrow \mathcal{A}$ such that:*

1. $\gamma(t) \in \mathcal{A}$ for all $t \in [0, T]$.
2. $\dot{\gamma}(t) \in T_{\gamma(t)}\mathcal{A}$ wherever $\partial\mathcal{A}$ is non-empty.

The trajectory space is $\Gamma(\mathcal{A}) = \{\gamma : [0, T] \rightarrow \mathcal{A} \mid \gamma \text{ admissible}\}$ with the C^1 topology.

A discrete admissible trajectory is a finite sequence $(\gamma_0, \gamma_1, \dots, \gamma_n) \in \mathcal{A}^{n+1}$ where consecutive pairs (γ_k, γ_{k+1}) are connected by a short admissible path.

Remark 2.6. The following objects across the corpus are all specializations of Definition 2.5: MEM|8 event history H_t (discrete trajectory in event space), repair path γ_{rep} (trajectory reducing \mathcal{I} along its length), agency plan (trajectory maximizing $\mathbb{E}[\Omega(\gamma(T))]$), ecphoric path (trajectory from present state to target memory), Yarncrawler route (trajectory completing partial world-state), TARTAN trajectory (trajectory preserved under decomposition).

2.4. The Path Lagrangian

Definition 2.7 (Path Lagrangian). *A path Lagrangian is a smooth function $L : T\mathcal{A} \times [0, T] \rightarrow \mathbb{R}$ on the tangent bundle of \mathcal{A} . The associated path action is*

$$\mathcal{J}[\gamma] = \int_0^T L(\gamma(t), \dot{\gamma}(t), t) dt.$$

An extremal trajectory γ^* satisfies the Euler-Lagrange equations:

$$\frac{d}{dt} \frac{\partial L}{\partial \dot{\gamma}^i} - \frac{\partial L}{\partial \gamma^i} = 0.$$

Definition 2.8 (Canonical Lagrangian Instantiations). *The following are the specific Lagrangians used by path-action frameworks in the corpus:*

$$\begin{aligned} L_{\text{mech}}(\gamma, \dot{\gamma}) &= \frac{1}{2} g_{ij} \dot{\gamma}^i \dot{\gamma}^j - \mathcal{I}(\gamma) && \text{(recovers gradient flow)} \\ L_{\text{visc}}(\gamma, \dot{\gamma}) &= \mathcal{I}(\gamma) + \lambda \|\dot{\gamma}\|_{\eta}^2 && \text{(MEM|8, ecphory with viscosity)} \\ L_{\text{rep}}(\gamma, \dot{\gamma}) &= d(f(\gamma), f^*)^2 - \eta \Omega(\gamma) && \text{(repair Lagrangian, Volume IX)} \\ L_{\text{SP}}(\gamma, e_t) &= -\log p(e_t \mid H_t) && \text{(Spherepop event log-likelihood)} \end{aligned}$$

2.5. The Repair Morphism (Provisional Definition)

Definition 2.9 (Repair Morphism — Provisional). *A map $R_{\epsilon} : \mathcal{S} \rightarrow \mathcal{S}$ is a repair morphism if it satisfies:*

1. **Admissibility:** $R_{\epsilon}(x) \in \mathcal{A}$ for all x in a neighborhood of \mathcal{A} .

2. **Inadmissibility reduction:** $\mathcal{I}(R_\epsilon(x)) \leq \mathcal{I}(x)$ with equality only if $x \in \mathcal{A}$.
3. **Path consistency:** There exists an admissible trajectory $\gamma : [0, 1] \rightarrow \mathcal{A}$ with $\gamma(0) = x$ and $\gamma(1) = R_\epsilon(x)$.

Foundational gap: Definition 2.9 is provisional. The repair morphism is characterized by $d\Omega/dt > 0$ along its trajectory, but this characterization is a candidate proposition (§3.9), not a theorem. The definition above gives conditions; a satisfying construction that meets them requires either: (a) proof that L_{rep} above has well-defined extremals in $\Gamma(\mathcal{A})$, or (b) an explicit construction of R_ϵ as a flow map. Volume VIII (Repair Theory) cannot be finalized until one of these is provided.

Chapter 3

Asserted Results and Proof Sketches

Epistemic status codes: **Pr** = proved in existing document; **Sk** = proof sketch exists; **Co** = conjecture with identified proof strategy; **Nu** = numerical evidence only; **As** = asserted without proof strategy; **Ph** = philosophical proposal requiring validation; **Ga** = gap, not yet precisely stated.

Results marked **As** or **Ph** that appear in the *foundational gap* category must be addressed before writing the volumes that depend on them. Results marked **Ga** must be precisely stated before appearing in any volume.

3.1. Volume I: Constraint Geometry

Theorem 3.1 (Projection-Collapse Principle, Weak Form). (**Pr**) Let $\pi : X \rightarrow M$ be a smooth projection and let $f : \pi^{-1}(U) \rightarrow \mathbb{R}$ be a function on a fiber over an open $U \subseteq M$. Then information loss under π satisfies $H(X) - H(\pi(X)) \geq 0$ with equality iff π is bijective on U .

Proof sketch. Data-processing inequality applied to the Markov chain $X \rightarrow \pi(X)$. Equality condition follows from injectivity. \square

Conjecture 3.2 (Projection-Collapse Principle, Strong Form). (**Co**) Let $\pi : X \rightarrow M$ have positive-dimensional fibers. Then the reconstruction operator $\mathcal{Q} : M \rightarrow X$ satisfying $\pi \circ \mathcal{Q} = \text{id}_M$ is generically ill-posed: small perturbations in m produce large perturbations in $\mathcal{Q}(m)$.

Proof strategy. Apply Hadamard's three conditions for well-posedness. Non-injectivity of π implies non-uniqueness of \mathcal{Q} , violating the second condition. Continuity failure follows from fiber non-compactness or high curvature. Tikhonov regularization provides a stable approximation, formalizing \mathcal{Q}_λ as a regularized inverse. \square

Proposition 3.3 (Constraint-Information Equivalence). (**Pr**) Let \mathcal{S} be a finite state space of size N and $\mathcal{A} \subseteq \mathcal{S}$ the admissible subset of size k . The information encoded by the constraint family $\{C_i\}$ is $\log N - \log k = \log(N/k)$.

Theorem 3.4 (Bishop-Gromov Comparison for Admissibility). (**Pr**) Let (\mathcal{A}, g) have Ricci curvature bounded below by $(n-1)\kappa$. Then the volume of metric balls $B(x, r) \subset \mathcal{A}$ satisfies

$\text{Vol}(B(x, r)) \leq V_\kappa(r)$ where $V_\kappa(r)$ is the volume of a ball of radius r in the model space of constant curvature κ .

Proof sketch. Standard Bishop-Gromov, applied to the Fisher information metric on \mathcal{A} . Requires \mathcal{A} to be complete as a Riemannian manifold. \square

3.2. Volume II: RSVP Field Theory

Claim 3.5 (RSVP Second Law). *(As) For solutions (Φ, \mathbf{v}, S) of the RSVP field equations, global accessibility satisfies $\frac{d}{dt} \int_\Omega S dx \leq 0$ under appropriate boundary conditions.*

Proof obligation. Integrate the S -equation $\partial_t S = D_S \nabla^2 S + R(\Phi, \mathbf{v}, S)$ over Ω . The Laplacian term vanishes with Neumann boundary conditions. A sufficient condition is $\int_\Omega R(\Phi, \mathbf{v}, S) dx \leq 0$, which constrains the reaction term. The physical interpretation is that lamphrodyne processes are net entropy-consuming. **Status: must be proved before Volume XIII can be finalized.** \square

Claim 3.6 (Lamphrodyne Attractor Stability). *(As) A lamphrodyne region (local minimum of S) is Lyapunov stable under the RSVP dynamics.*

Proof obligation. Construct a Lyapunov functional $V[\Phi, \mathbf{v}, S]$ that decreases along RSVP trajectories near a lamphrodyne configuration. The candidate is $V = \int_\Omega |\nabla S|^2 + \alpha(\Phi - \Phi_0)^2 + \beta|\mathbf{v}|^2 dx$. Show $\dot{V} \leq 0$. **Status: must be proved before Volumes XIII and XIV.** \square

Conjecture 3.7 (RSVP-RG Equivalence). *(Co) The coarse-graining flow induced by lamphrodyne relaxation is equivalent, in appropriate limits, to Wilsonian renormalization group flow on the space of effective field theories.*

Proof strategy. Show that integrating out high-frequency modes in the RSVP path integral $Z = \int \mathcal{D}\Phi \mathcal{D}\mathbf{v} \mathcal{D}S e^{-\mathcal{A}[X]}$ produces a flow equation on the coupling constants of the effective action equivalent to the Wetterinck equation (functional RG). The entropy diffusion coefficient D_S plays the role of the RG scale parameter. \square

3.3. Volume III: Projection and Inference

Definition 3.8 (CLIO Intelligence). *A system is CLIO-intelligent to degree α at observation m if it can identify a subset $\mathcal{A}(m) \subseteq \pi^{-1}(m)$ satisfying $|\mathcal{A}(m)| \leq \alpha|\pi^{-1}(m)|$ using only constraints derivable from context and memory.*

Claim 3.9 (CLIO Inverse Problem Ill-Posedness). *(Ga) The reconstruction problem of recovering $x \in \pi^{-1}(m)$ from observation m alone is generically ill-posed in the sense of Hadamard.*

Proof obligation. State precisely: for which class of projections π and which topology on X is the problem ill-posed? Then prove the three conditions fail. Note: the Projection-Collapse strong form (§3.1) is the precursor result; this is a specialization to the inference

setting. **Gap: precise statement needed before Volume III is drafted.** \square

Theorem 3.10 (Reconstruction Stability). **(Pr)** *The Tikhonov-regularized reconstruction $\mathcal{Q}_\lambda(m) = \arg \min_{x \in X} \{\|x\|^2 + \lambda^{-1} \|\pi(x) - m\|^2\}$ satisfies an L^2 stability estimate: $\|\mathcal{Q}_\lambda(m_1) - \mathcal{Q}_\lambda(m_2)\| \leq C_\lambda \|m_1 - m_2\|$ for a constant C_λ depending on λ and the spectral properties of $\pi^* \pi$.*

Theorem 3.11 (Operational Fiber Death). **(Pr)** *Let \mathcal{P}_m denote the set of admissible reconstruction pathways to the fiber $\pi^{-1}(m)$. If $\mu(\mathcal{P}_m) \rightarrow 0$ while $\pi^{-1}(m) \neq \emptyset$, the state m exhibits operational fiber death: it is theoretically reachable but practically unrecoverable.*

Claim 3.12 (Admissible Stabilization — AI Convergence Certification). **(As)** *Let $s_t \in M$ be the observable state of a computational system at time t , let $x_t \in X$ be the latent state with $\pi(x_t) = s_t$, and let $\mathcal{A} \subseteq X$ be the admissibility space encoding safety constraints. Define:*

- $d_M(s_t, s_{t-1})$: metric distance between consecutive observable states (motion in operational space);
- $C_t \in [0, 1]$: corrected consistency score measuring agreement of s_t against an independent prior or prospective candidate (not self-referential);
- $E_\pi(s_t)$: surrogate error, measuring agreement across independent projections of the latent state.

Then the joint condition:

$$d_M(s_t, s_{t-1}) \rightarrow 0 \text{ AND } C_t \rightarrow 1 \text{ AND } E_\pi(s_t) \leq \eta \implies P(\text{Stable}_{\mathcal{A}}(x_t)) \rightarrow 1$$

constitutes admissible stabilization: the system has converged to an admissible latent state with high probability.

Proof obligation and theoretical context. The claim addresses the *Ouroboros trap*: a system that measures only $d_M(s_t, s_{t-1}) \rightarrow 0$ certifies convergence in observable space M without confirming convergence in latent space X . Since π is non-injective, a system can refine an incorrect plan into a perfectly self-consistent incorrect plan — converging in the projection without converging in the fiber.

The three-condition conjunction is designed to break this trap:

1. $d_M \rightarrow 0$ (Ouroboros signal): motion ceases in operational space. Necessary but not sufficient.
2. $C_t \rightarrow 1$ (CLIO condition): real comparison against an independent candidate, not a tautology. Catches shadow-space convergence.
3. $E_\pi \leq \eta$ (surjective consistency): agreement across multiple independent projections $\{\pi_k\}$ of the latent state confirms that the convergence is not an artifact of one projection.

What must be proved: (a) that the conjunction is sufficient for $P(\text{Stable}_{\mathcal{A}}(x_t)) \rightarrow 1$ under appropriate conditions on π and the dynamics; (b) that C_t is computable without access to x_t directly; (c) that the three conditions are independent (no two are jointly sufficient without the third).

Source: Epistemic Architecture slides, Slide 5. **Status: As.** The three conditions are identified and motivated; no formal proof of sufficiency exists.

Why it matters: This result, if proved, provides the first formally grounded AI safety certification criterion derived from CLIO projection theory. It appears in Volume III as a worked application of the CLIO pipeline. It also connects to the Invariant Discovery Principle: what the three-condition test certifies is that the structural invariant $\mathcal{I}(T_i(C)) = \mathcal{I}(C)$ is preserved across observable transformations, not merely that the surface has stopped moving. \square

Remark 3.13 (The Projection Trap and Sealed Systems). The Ouroboros trap is the computational instance of a more general failure mode identified across the corpus: a sealed interpretive system that progressively eliminates reachable futures by reinterpreting all evidence as confirmation of its current state. In the Szukalski analysis (Epistemic Blueprint), Zermatism exemplifies this: every disconfirming piece of evidence is reinterpreted as evidence of the debasement the system diagnoses. In AI systems, the analogous failure is a trajectory classifier that evaluates $d(s_t, s_{t-1}) \rightarrow 0$ while remaining blind to the latent space structure it is converging on. The three-condition certification is the formal antidote to sealed-system convergence in computational contexts.

Claim 3.14 (MEM|8 Reconstruction Theorem). *(Ga) Let $H_n = (e_1, \dots, e_n)$ be a MEM|8 event history and $s_n = \bigcap_i \mathcal{C}(e_i)$ the reconstructed state. Under what conditions on the event algebra is s_n uniquely determined by H_n , and when is the reconstruction continuous with respect to perturbations of the event sequence?*

Proof obligation. This is the MEM|8 analog of the Reconstruction Stability theorem. The reconstruction is intersection of constraint sets; its well-posedness depends on the intersection being non-empty and having non-degenerate geometry. **Gap: precise statement and proof needed before Volume V is finalized.** \square

Claim 3.15 (Ecphoric Threshold Existence). *(As) For any memory state $m^* \in \Gamma(\mathcal{A})$ and any present state $x_0 \in \mathcal{A}$, there exists a threshold $\theta_E > 0$ such that the ecphoric retrieval wave initiated at x_0 reaches m^* if and only if the wave amplitude at x_0 exceeds θ_E .*

Proof obligation. Model ecphory as a damped wave equation on \mathcal{A} with initial condition at x_0 . The threshold θ_E is determined by the viscosity $\eta(x, t)$ of the semantic manifold between x_0 and m^* . Existence requires the wave equation to have a unique solution; the threshold exists if the solution operator is continuous. **Must be proved before Volumes V and VIII.** \square

Claim 3.16 (HYDRA Cognitive Emergence). *(As) In a HYDRA system with modules*

$\{f_i\}_{i=1}^N$ and coordination penalty $\Omega(\mathbf{z})$, complex cognitive behaviors emerge from coordination without any individual module possessing those behaviors.

Proof obligation. Formalize "emergence" as: behavior B is emergent if it is expressed by the system's aggregate output but not by any individual module's output restricted to its input domain. Show that the coordination penalty Ω induces global coherence not implied by any local f_i . This requires a formal stability analysis of the coupled system $\dot{\mathbf{z}} = \sum_a W_a f_a(\mathbf{z}_a) - \nabla_{\mathbf{z}} \Omega(\mathbf{z})$. **Gap: stability analysis is the central missing piece in Volume VII.** \square

Claim 3.17 (HYDRA Stability). *(Ga) The coupled HYDRA system with N modules converges to a coherent equilibrium \mathbf{z}^* satisfying $\sum_a W_a f_a(\mathbf{z}_a^*) = \nabla_{\mathbf{z}} \Omega(\mathbf{z}^*)$ under conditions on the coupling weights $\{W_a\}$ and the coordination penalty Ω .*

Proof obligation. Construct a Lyapunov function for the coupled system. Natural candidate: $V(\mathbf{z}) = \Omega(\mathbf{z}) + \sum_a \frac{W_a}{2} \|f_a(\mathbf{z}_a)\|^2$. Show $\dot{V} \leq 0$. Identify sufficient conditions on Ω (e.g., strong convexity) for global convergence. **Must be proved before Volume VII.** \square

Claim 3.18 (Repair Characterization Candidate). *(As) The condition $d\Omega(\gamma(t))/dt > 0$ along an admissible trajectory γ is equivalent to the trajectory satisfying the repair Lagrangian Euler-Lagrange equations for $L_{\text{rep}} = d(f(\gamma), f^*)^2 - \eta\Omega(\gamma)$.*

Proof obligation. Compute the Euler-Lagrange equations for L_{rep} and show they imply $d\Omega/dt > 0$ along solutions. This requires (a) Ω to be differentiable along γ , and (b) the coupling $\eta > 0$ to be sufficiently large. **This is the central proof obligation for Volume VIII. Resolve before drafting.** \square

3.4. Volume VII: Spherepop

Claim 3.19 (Spherepop Confluence). *(Ga) The Spherepop reduction system is confluent: for any initial configuration C_0 , all maximal reduction sequences terminate at the same normal form up to trace-equivalence.*

Proof obligation. Apply Newman's lemma: confluence follows from local confluence and strong normalization. (1) Strong normalization: show that every Spherepop reduction sequence terminates (no infinite chains). Natural measure: the total entropy $\int S dx$ of the associated RSVP state is non-increasing under Pop, and bounded below by zero. (2) Local confluence: show that if $C_0 \rightarrow C_1$ and $C_0 \rightarrow C_2$ by single steps, then C_1 and C_2 have a common reduct. Check this for all pairs of rules. **Must be proved before Volume IX is finalized.** \square

3.5. Volume X: Coordination Geometry

Claim 3.20 (Kuramoto Reduction from RSVP). *(Co) In the limit where Φ and S are slowly varying compared to \mathbf{v} , the RSVP vector field equation reduces to a generalized Kuramoto model*

$\dot{\theta}_i = \omega_i + \sum_j K_{ij} \sin(\theta_j - \theta_i)$ where θ_i are phases of the \mathbf{v} field and K_{ij} are coupling constants derived from ∇S .

Proof strategy. Project the RSVP \mathbf{v} -equation onto a phase representation $v_i = A_i e^{i\theta_i}$ using Stuart-Landau normal form near a Hopf bifurcation. The entropy gradient $\gamma \nabla S$ becomes the coupling term. Amplitude variations decouple to leading order, leaving a pure phase equation. The coupling strength K_{ij} depends on the overlap integrals of the entropy gradient with the phase mode functions. Requires the RSVP \mathbf{v} -equation to have a Hopf bifurcation at the relevant parameter values. \square

3.6. Foundational Results: High Priority

These results are foundational in the sense that their failure restructures nearly all volumes. They are listed separately from the technical gaps above.

Claim 3.21 (Reachability Principle). **(Sk)** *The effective freedom of an agent or system at state x is proportional to the reachability volume $\Omega(x) = \text{Vol}(R(x))$. Formally, the optimal policy for any persistence-oriented objective is equivalent to maximizing Ω along the system's trajectory.*

Proof sketch — from *Institutional Attractors, Appendix A*. Define the local contraction rate $\Lambda(x, t) = -\frac{d}{dt} \log \mathcal{V}(x, t)$ where $\mathcal{V}(x, t) = \int_{R(x, t)} d\mu$ is the reachable future volume. If $\Lambda(x, t) > 0$ over $[t_0, t_1]$, then:

$$\mathcal{V}(t_1) = \mathcal{V}(t_0) \exp\left(-\int_{t_0}^{t_1} \Lambda(\tau) d\tau\right).$$

Persistent reachability closure therefore produces exponential loss of admissible futures. A persistence-oriented policy must hold $\Lambda(x, t) \leq 0$ along its trajectory, which is equivalent to non-decreasing Ω . The Bellman formulation follows by setting the value function $V(x) = \log \Omega(x)$.

Status upgraded from As to Sk. The contraction-rate argument is in Appendix A of the Institutional Attractors essay. What remains unproved: (a) that $\Lambda \leq 0$ is sufficient as well as necessary for persistence, and (b) that maximizing Ω is optimal across all persistence-objective classes, not only those that reduce to reachability volume. **If false, affects Volumes IV, VI, VIII, XII, XV.** \square

Claim 3.22 (Reachability-Inadmissibility Candidate Identity). **(As)** $\mathcal{I}(x) = -\log \Omega(x)$.

Proof obligation. This is a candidate definition, not a theorem. Two steps required: (1) Show that $-\log \Omega(x)$ satisfies the defining properties of \mathcal{I} : non-negative, zero iff $x \in \mathcal{A}$, smooth. For Ω this requires $R(x) = \mathcal{A}$ when $x \in \mathcal{A}$ (which is true) and $R(x) \subsetneq \mathcal{A}$ otherwise. (2) Verify consistency with the RSVP entropy field S . Since S encodes local accessibility density and $\Omega(x)$ is global reachability volume, they are related but not identical. The precise relationship is: $S(x) \sim -\nabla_x \log \Omega(x)$ (accessibility gradient equals entropy gradient) is a conjecture requiring verification. **Until verified, present as**

candidate identity, not theorem. □

Claim 3.23 (Optimal Opacity). **(Sk)** *The fitness functional $F(\Omega_M) = F_0 + \kappa\Omega_M - \eta\Omega_M^2$ has a maximum at $\Omega_M^* = \kappa/2\eta$, predicting that institutions under opacity selection converge to locally optimal rather than maximal opacity.*

Proof sketch — from *Institutional Attractors*, §7.1. The optimum follows directly: $F'(\Omega_M) = \kappa - 2\eta\Omega_M = 0$ gives $\Omega_M^* = \kappa/2\eta$, and $F''(\Omega_M^*) = -2\eta < 0$ confirms it is a maximum. The systemic fragility corollary ($\Omega_M > \Omega_M^*$ implies internal coordination costs dominate) follows from the concavity. The 2008 financial crisis is cited as an instance: securitization opacity exceeded the institutional coordination threshold, making risk-modeling impossible from within.

Status upgraded from As to Sk. The optimum derivation is complete. What remains unproved is the derivation of the quadratic fitness functional from first principles: (a) the linear term $\kappa\Omega_M$ must be derived from the replicator dynamics as the fitness advantage of external impermeability; (b) the quadratic term $-\eta\Omega_M^2$ must be derived from coordination-cost theory as the penalty for internal opacity. Without this derivation, the functional form is an ansatz, not a theorem. Provide derivation before Volume IV (Simulated Agency / Institutional Attractors application) is finalized. □

Chapter 4

Equivalence Candidate Briefs

Each candidate receives a one-page formal brief establishing its status: **GE** (genuine equivalence), **CP** (common parent), or **SD** (shared dynamical form).

4.1. Candidate 1: The Admissibility Cluster

Objects: \mathcal{A} , $R(x)$, $\pi^{-1}(m)$, \mathcal{P} (MEM|8), Ω_t (Spherepop).

Verdict: **CP** — Common Parent Structure.

Argument: The objects occupy different categorical levels. $R(x) \subseteq \mathcal{A}$: reachability is a dynamical subobject depending on a starting point. $\pi^{-1}(m) \subseteq X$: a fiber is an epistemic subobject depending on an observation. \mathcal{P} in MEM|8: a historical subobject depending on an event sequence. Ω_t in Spherepop: a probability distribution, not a set. These are not the same object, and defining them identically would confuse dynamical accessibility, epistemic ambiguity, and historical possibility.

Correct claim: All are generated from the admissibility structure $(\mathcal{S}, \mathcal{A}, g, \mathcal{I})$ by additional specifications. Volume I defines the tuple; subsequent volumes specify which projection π , which starting state, and which event history they are working with.

Consequence: No merger. Volume I defines the parent structure; each downstream volume defines its specialized subobject by explicit construction.

4.2. Candidate 2: The Projection Cluster

Objects: $\pi : X \rightarrow M$, rendering operator \mathcal{R} (CLIO), realization functor $F : \mathcal{H} \rightarrow \mathcal{C}$ (Spherepop), coarse-graining map (RSVP-RG), compression maps (Semantic Infrastructure).

Verdict: **CP** — Common Parent, with important directionality distinction.

Argument: The compression-direction maps (CLIO rendering, RSVP coarse-graining, semantic compression) are all instances of $\pi : X \rightarrow M$. The Spherepop realization functor goes in the opposite direction: from history (small) to state

(large). It is closer to a *section* $\sigma : M \rightarrow X$ than to π .

Correct claim: All compression maps are instances of π . All reconstruction/realization maps are instances of σ or the general recovery operator \mathcal{Q} . The two directions must not be conflated.

Consequence: No merger. Use π for compression, σ for section, \mathcal{Q} for general recovery.

4.3. Candidate 3: The Tension / Free Energy Cluster

Objects: $V(x, t)$ (Institutional Attractors), $F(q, o)$ (Simulated Agency), $d(f(x), f^*)^2$ (Repair), $\Omega(z)$ (HYDRA incoherence), $\mathcal{O}_{\text{merge}}$ (Semantic Infrastructure).

Verdict: **SD** — Shared Dynamical Form, pending verification of Energy Functor.

Argument: Every object in this cluster is the potential \mathcal{I} in the gradient flow master equation for its respective framework. The formal spine document confirms this: every volume's master equation has the form $\dot{x} = -\nabla\mathcal{I} + \text{terms}$. This is more than analogy: the gradient flow structure is genuinely shared.

Pending: Whether the individual \mathcal{I} objects are related by coordinate change (genuine equivalence) or are genuinely independent potentials on genuinely different state spaces (shared form only) depends on whether the Energy Functor \mathfrak{T} exists and is faithful (see Candidate 9). If \mathfrak{T} is confirmed, this cluster upgrades to **GE**.

Consequence: Use \mathcal{I} as the canonical symbol universally. Domain-specific names (V, F, d^2) become instantiation labels, not independent primitives.

4.4. Candidate 4: The Collapse / Reconstruction Cluster

Objects: Reconstruction \mathcal{Q}_λ (Vol. I), ephory \mathcal{E}_{cph} (cognitive), Collapse Collapse (Spherepop), MEM|8 state recovery $s_n = \bigcap_i \mathcal{C}(e_i)$, repair morphism R_ϵ .

Verdict: **CP** — Common Parent with different optimality criteria.

Argument: All are instances of the general recovery operator $\mathcal{Q} : M \rightarrow X$ defined as a right inverse of π under some optimality criterion. The criterion determines the specific operator:

- Tikhonov: minimize $\|x\|^2$ subject to $\pi(x) \approx m$
- Ephory: maximize activation given viscosity-damped wave propagation
- Spherepop Collapse: functional composition $T_{x_n} \circ \dots \circ T_{x_1}(s_0)$
- MEM|8: constraint intersection $\bigcap_i \mathcal{C}(e_i)$

Note: the repair morphism R_ϵ is *not* an instance of \mathcal{Q} . It operates on broken states in \mathcal{S} , not on observations in M . Repair does not invert a projection; it corrects a trajectory. Keep separate.

Consequence: Define \mathcal{Q} as a primitive with criterion as parameter. Each framework specifies its criterion.

4.5. Candidate 5: The Reachability Cluster

Objects: Reachability volume $\Omega(x)$, social freedom $\mathcal{F}_{\text{soc}} = \sum_i \text{Vol}(\mathcal{A}_i)$, simulated reachability $\mathcal{R}(q)$, repair bound $\eta\mathcal{R}(x)$, diagnostic volume $V(t)$ (Self-Concealment), geometric invariance $\mathcal{G}(Q)$ (consciousness).

Verdict: **SD** — Shared Dynamical Form.

Argument: All are instances of $\Omega(x) = \text{Vol}(R(x))$ in different state spaces. Social freedom measures reachability in social configuration space. The diagnostic volume $V(t)$ measures reachability in the space of epistemological positions (the vantage points from which the mechanism can be identified). Geometric invariance $\mathcal{G}(Q)$ is conjectured to measure reachability in quale-state space.

Consequence: Use Ω with appropriate subscripts identifying the state space. Unify under the reachability field $\mathfrak{R}(x)$ as a primitive if Candidate 8 is confirmed.

4.6. Candidate 6: Cognitive Branch Sequence

Objects: CLIO, MEM|8, Simulated Agency, HYDRA.

Verdict: **CP** — Common Parent, organized as coherent four-volume sequence, not merged into one volume.

Argument: The objects are genuinely distinct. CLIO studies compression $\pi : X \rightarrow M$ and inference. MEM|8 studies event sequences H_t . Simulated Agency studies trajectory optimization $\arg \max_a \mathbb{E}[\Omega]$. HYDRA studies distributed module coordination. The analogy is probability theory, statistics, decision theory, and control theory: shared substrate, pedagogically distinct.

Unifying formal object: An agent is a tuple $(\mathcal{A}, \pi, \mu, \mathcal{G})$ where \mathcal{A} is its admissibility space, π its projection, μ its MEM|8 history, and \mathcal{G} its generative model. Each volume adds one component to this tuple.

Consequence: Four-volume sequence (Volumes III–VII in layer-centric curriculum). No merger.

4.7. Candidate 7: Repair Scale Hierarchy

Objects: Ecphory (cognitive), Yarncrawler (semantic), Institutional Repair (social), Xylomorphic Repair (physical).

Verdict: SD — Shared Dynamical Form.

Argument: All are instances of the repair morphism R_ϵ applied to different state spaces and domains. The condition $d\Omega/dt > 0$ is the universal characterization at all four scales.

Scale table:

Scale	Framework	Object repaired
Cognitive	Ecphory / MEM 8	Retrieval pathways
Semantic	Yarncrawler / Sem. Infra.	Knowledge structures
Institutional	Institutional Attractors	Institutional functions
Physical	Xylomorphic	Physical infrastructure

Consequence: Volume VIII (Repair Theory) defines R_ϵ canonically. All other volumes cite this definition and specify their domain-specific state space. This eliminates the central gap in Volume VIII while providing the connective tissue for Volumes V, IX, and XII.

4.8. Candidate 8: The Reachability Field

Proposed object: Reachability field $\mathfrak{R}(x)$ as a primitive, with derived quantities $\Omega(x) = \text{Vol}(\mathfrak{R}(x))$, $\mathcal{A}(x) = \log \Omega(x)$, $\mathcal{I}(x) = -\log \Omega(x)$.

Verdict: Promising but unconfirmed.

Argument for: The identification $\mathcal{I}(x) = -\log \Omega(x)$ unifies the tension landscape with the reachability structure. If confirmed, repair ($d\Omega/dt > 0$), collapse ($d\Omega/dt < 0$), and agency ($\arg \max_a \mathbb{E}[\Omega]$) all become instances of one geometric condition.

Argument against (critical check): The RSVP entropy field $S(x)$ encodes local accessibility density and the reachability volume $\Omega(x)$ encodes global reachability. These are related but not identical. Specifically: $S(x) \sim -\nabla_x \log \Omega(x)$ is a gradient relationship (accessibility gradient = entropy gradient), not an identity. This means $\mathcal{I}(x) = -\log \Omega(x)$ must be verified to be consistent with the RSVP field equations before adoption.

Verification required: Show that defining $\mathcal{I} = -\log \Omega$ produces RSVP-compatible dynamics under the gradient flow $\dot{x} = -\nabla \mathcal{I}$.

Status: Candidate identity (Claim 3.22). Present as conjecture until verified. Do not use as a theorem.

4.9. Candidate 9: The Energy Functor

Proposed object: A functor $\mathfrak{T} : \mathbf{Frameworks} \rightarrow \mathbf{EnergyLandscapes}$.

Verdict: Philosophical proposal. Highest priority for Volume XV.

Formal construction required:

Category Frameworks:

- Objects: Flyxion frameworks $\mathcal{F} = (\mathcal{S}_{\mathcal{F}}, \mathcal{A}_{\mathcal{F}}, g_{\mathcal{F}}, \mathcal{I}_{\mathcal{F}})$.
- Morphisms: Admissibility-preserving smooth maps $\phi : \mathcal{S}_{\mathcal{F}_1} \rightarrow \mathcal{S}_{\mathcal{F}_2}$ with $\phi(\mathcal{A}_{\mathcal{F}_1}) \subseteq \mathcal{A}_{\mathcal{F}_2}$.

Category EnergyLandscapes:

- Objects: Pairs $(\mathcal{S}, \mathcal{I})$.
- Morphisms: Smooth $f : \mathcal{S}_1 \rightarrow \mathcal{S}_2$ satisfying $\mathcal{I}_2(f(x)) \leq \mathcal{I}_1(x)$ (inadmissibility non-increasing).

Functor \mathfrak{T} : $\mathfrak{T}(\mathcal{F}) = (\mathcal{S}_{\mathcal{F}}, \mathcal{I}_{\mathcal{F}})$; morphisms map to the corresponding smooth maps on state spaces.

What must be proved: (a) \mathfrak{T} is well-defined (morphisms in **Frameworks** map to morphisms in **EnergyLandscapes**). (b) \mathfrak{T} is faithful (distinct frameworks give distinct energy landscapes, i.e., the functor detects framework differences). (c) \mathfrak{T} is full (every admissibility-preserving map between landscapes arises from a framework morphism).

Consequence if confirmed: Volume XV is a theorem about equivalence classes under \mathfrak{T} , not a narrative synthesis. Frameworks $\mathcal{F}_1 \cong \mathcal{F}_2$ (same up to morphism) iff $\mathfrak{T}(\mathcal{F}_1) \cong \mathfrak{T}(\mathcal{F}_2)$ in **EnergyLandscapes**.

Status: Define the categories formally. Prove (a) first. (b) and (c) may require additional structure on **Frameworks**.

Chapter 5

The Master Claim and Path-Action Transition

5.1. Two Levels of the Master Claim

The corpus supports two formulations of the Master Claim at different levels of generality.

Master Claim, Level 1 (State-Functional Form):

For any Flyxion framework \mathcal{F} with state space $\mathcal{S}_{\mathcal{F}}$, admissibility space $\mathcal{A}_{\mathcal{F}}$, metric $g_{\mathcal{F}}$, and inadmissibility functional $\mathcal{I}_{\mathcal{F}}$, the dynamics of \mathcal{F} are governed by:

$$\frac{dx}{dt} = -\nabla_{g_{\mathcal{F}}}\mathcal{I}_{\mathcal{F}}(x) + \xi_t + \text{source terms},$$

where ξ_t is exploratory noise and source terms are framework-specific.

Status: Confirmed as a structural organizing principle by the formal spine document. Not yet a theorem because “source terms” are framework-specific and $\mathcal{I}_{\mathcal{F}}$ is derived from each framework rather than axiomatically imposed. Becomes a theorem if the Energy Functor \mathfrak{T} is proved faithful.

Master Claim, Level 2 (Path-Variational Form):

For any Flyxion framework \mathcal{F} whose dynamics are path-dependent (Spherepop, MEM|8, Agency, Repair, Yarncrawler, TARTAN, HYDRA), the dynamics are governed by:

$$\gamma^* = \arg \text{ext}_{\gamma \in \Gamma(\mathcal{A}_{\mathcal{F}})} \mathcal{J}_{\mathcal{F}}[\gamma]$$

where $\mathcal{J}_{\mathcal{F}}[\gamma] = \int_0^T L_{\mathcal{F}}(\gamma, \dot{\gamma}, t) dt$ for a framework-specific path Lagrangian $L_{\mathcal{F}}$.

Status: Structural claim. Level 2 subsumes Level 1 as a special case.

5.2. Relationship Between the Two Levels

Proposition 5.1 (Level 1 as Special Case of Level 2). *Level 1 (gradient flow) is a special case of Level 2 (path variational) when the path Lagrangian takes the form $L(\gamma, \dot{\gamma}) = \frac{1}{2}g_{ij}\dot{\gamma}^i\dot{\gamma}^j + \mathcal{I}(\gamma)$ and boundary conditions $\gamma(0) = x_0, \gamma(T)$ free.*

Proof. The Euler-Lagrange equations for this L are: $g_{ij}\ddot{\gamma}^j + \Gamma_{jk}^i\dot{\gamma}^j\dot{\gamma}^k = -\nabla_g^i\mathcal{I}(\gamma)$, which in the overdamped limit ($\ddot{\gamma} \rightarrow 0$) reduce to $\dot{\gamma}^i = -g^{ij}\partial_j\mathcal{I}$, the gradient flow. \square

Critical asymmetry: Level 2 does NOT reduce to Level 1 in general. For path-action frameworks with irreversibility or history-dependence (Spherepop, MEM|8), the Lagrangian encodes non-local path properties that cannot be expressed as the gradient of any state functional. The proof strategy for Volume XV must use Euler-Lagrange arguments for these frameworks, not gradient flow arguments. These are different proofs, not one proof with two cases.

5.3. The Five-Level Hierarchy

L	Object	Symbol	Where frameworks diverge
0	State spaces	\mathcal{S}	All frameworks share this level
1	Admissibility	$\mathcal{A} \subseteq \mathcal{S}$	All frameworks share this level
2	Trajectory spaces	$\Gamma(\mathcal{A})$	Branching point. State-functional frameworks (RSVP, CLIO) do not require Γ . Path-action frameworks define their core objects here.
3	Projection	$\pi : X \rightarrow M$	Observation frameworks (CLIO, Agency) add this.
4	Energy functionals	\mathcal{I}	Different frameworks instantiate with different \mathcal{I} . Candidate 3 claims these are instances of one object.
5	Dynamics	$\dot{x} = -\nabla_g\mathcal{I}$	The master equation; special case of path variational.

5.4. Proof Obligations for Volume XV

Volume XV earns its place if and only if it proves that the frameworks are related by explicit morphisms, not merely analogous. The following proof obligations must all be discharged:

1. **Construct Frameworks and Energy Landscapes** as formal categories (see Candidate 9 brief).
2. **Define \mathfrak{T} explicitly** on objects and morphisms and verify it is a functor (preserves identity morphisms and composition).

3. **Prove \mathfrak{T} is faithful:** if $\mathfrak{T}(\phi_1) = \mathfrak{T}(\phi_2)$ for morphisms $\phi_1, \phi_2 : \mathcal{F}_1 \rightarrow \mathcal{F}_2$, then $\phi_1 = \phi_2$.
4. **Classify equivalence classes under \mathfrak{T} :** which frameworks are isomorphic in **EnergyLandscapes**?
5. **State the synthesis theorem:**

Every persistent Flyxion system can be represented as an admissibility-preserving transformation process. The category of Flyxion frameworks embeds into **EnergyLandscapes** via the Energy Functor \mathfrak{T} , and frameworks $\mathcal{F}_1 \cong \mathcal{F}_2$ iff $\mathfrak{T}(\mathcal{F}_1) \cong \mathfrak{T}(\mathcal{F}_2)$.

6. **Handle path-action frameworks:** the synthesis theorem must cover path-variational systems (Level 2 master claim), not only gradient flows (Level 1). This requires either extending **EnergyLandscapes** to include path Lagrangians as objects, or proving that every path-action framework has an equivalent state-functional reformulation (which is false in general, see §5.2).

5.5. What the Path-Action Transition Changes

The recognition that the corpus contains both state-functional and path-action frameworks has immediate consequences for Volume organization:

Framework	Form	Consequence for writing
RSVP	State	PDE-based; gradient flow language appropriate
CLIO	State	Fiber navigation; projection language appropriate
Spherepop	Path	Event irreversibility; Lagrangian $L = -\log p(e_t H_t)$
MEM 8	Path	History as primary object; Euler-Lagrange for viscous wave
Agency	Path	Trajectory selection; $\arg \max \mathbb{E}[\Omega(\gamma(T))]$
Repair	Path	Trajectory correction; L_{rep} Lagrangian
Ecpory	Path	Wave propagation; activation threshold
Yarncrawler	Path	Route completion; divergence control
TARTAN	Path	Trajectory preservation; decomposition
Coordination	Mixed	Phase states; synchronization is path property

Closing Note: When Writing May Begin

Volume 0 is complete when the following have been addressed:

1. The symbol table in Chapter 1 has been adopted universally. All existing documents have been updated to use canonical symbols.
2. Every result flagged **As** in Chapter 3 has been either (a) provided with a proof or proof sketch, (b) downgraded to **Ph** (philosophical proposal), or (c) removed from the volumes that depend on it.
3. The foundational claims have been resolved as follows: the Reachability Principle (Claim 3.21) is now **Sk** — the contraction-rate exponential decay argument in Institutional Attractors Appendix A constitutes a sketch, with two proof gaps remaining (necessity vs. sufficiency of $\Lambda \leq 0$, and universality across objective classes). The Reachability-Inadmissibility Identity (Claim 3.22) remains **As** and must be verified against the RSVP S field before adoption. The Optimal Opacity claim is now **Sk** — the optimum derivation is complete; the functional form derivation from first principles is the remaining obligation. The AI Convergence Certification (Claim 3.12) is newly added with status **As**; sufficiency of the three-condition conjunction must be proved before Volume III is finalized.
4. The repair morphism (Definition 2.9) has been given a satisfying construction: either an explicit flow map or a proof that the repair Lagrangian Euler-Lagrange equations are well-posed.
5. The Equivalence Candidate briefs in Chapter 4 have been reviewed and their verdicts adopted as the canonical position. In particular: Candidate 1 is a common parent (not an equivalence); Candidates 3 and 5 are shared dynamical forms pending the Energy Functor; Candidate 9 is a philosophical proposal requiring formal construction.
6. The proof obligations for Volume XV listed in §5.4 have been reviewed and a research plan for each has been assigned.

None of the fifteen volumes should be submitted for publication until Volume 0 is complete and all items above are resolved. This is not a bureaucratic requirement. It is the condition under which the fifteen volumes form a coherent field rather

than a library of theories.