

PLCT — Phase Progression and Admissibility/Stability Results

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Version: 1.0.1

Release date: 2026-04-27

Document type: End-of-cycle technical report

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Abstract

The Projection-Limited Cognition Testbed (PLCT) is a confidential research program investigating representation-theoretic limits on measurement and dynamic stability in self-referential measurement systems. The program executed six contract-first, phase-gated experimental phases (Phases 1, 2, 2.x, 3, 4, 5, 6) and two amendment tracks (A-P6-1, A-P6-2) under a single fixed seed (20260425) and a strict no-post-hoc-tuning discipline.

Phase 6 established that dynamic self-referential measurement stability is achievable: 2 of 6 ($\Phi \times \text{CPM}$) configurations passed Gate 6, both under the PRP coherence-preserving method. Amendment track A-P6-1 then tested whether a framework-specific tetrahedral / fractional-memory lift of Phase 6 preserves stability under a stricter geometric-non-degeneracy gate; it did not — Gate A-P6-1 failed for all 6 pairs, and the two Phase 6 PASS pairs regressed under the lift. Amendment track A-P6-2 subsequently certified, under explicit closure / non-degeneracy / Lipschitz / projection / measurement-compatibility criteria with mutual-alignment invariants and boundary-stress evidence, that 4 of 6 pairs satisfy point-wise admissibility ($\Phi-1 \times \text{LVS}$, $\Phi-1 \times \text{PRP}$, $\Phi-3 \times \text{LVS}$, $\Phi-3 \times \text{PRP}$); the two $\Phi-4$ pairs did not certify. The cross-phase synthesis is that **stability requires both admissibility and temporal alignment under iteration**: admissibility certified at A-P6-2 is a necessary but not sufficient condition for the trajectory stability tested at A-P6-1.

Three explicit non-claims are preserved across all artifacts: A-P6-1 / A-P6-2 do not establish or refute consciousness, do not solve the Phase 5 calibration anomaly, and do not generalize beyond the bound configurations on the single bound seed.

Section 1 — Overview

1.1 Purpose of PLCT

PLCT investigates how the structure of measurement constructions interacts with classifier capacity, geometric representation, and dynamic self-reference. The program isolates a single research question per phase, freezes the experimental setup as a Research Specification Protocol (RSP) before execution, and reports outcomes — including negative outcomes — exactly as observed.

Phases 1 through 6 operate over a synthetic environment family (E1, E2; with E2 used as the canonical environment from Phase 4 onward) and a feature-projection mechanism (Π_{full} , the oracle-visible full-projection over a fixed candidate pool). Subsequent amendment tracks (A-P6-1, A-P6-2) extend Phase 6 with framework-specific structural reformulations.

1.2 Methodology discipline

Each phase / amendment is governed by the following discipline pattern:

1. **RSP draft.** A pre-registered Research Specification Protocol enumerates objectives, gates, methods, parameters, explicit non-claims, and pre-declared failure modes.
2. **Binding questions.** Open design questions are surfaced before signing; each receives an explicit user binding.
3. **Freeze.** The RSP is frozen at signature; its SHA-256 is captured. Implementation begins only after signature.
4. **Stage execution.** Each stage is executed in order; intermediate JSON records are written.
5. **Pre-execution analytic verification (Stage 0).** Introduced at A-P6-1 v3 and carried forward to A-P6-2: analytic checks must pass before any sampling or trajectory work.
6. **Regression lock (Stage 1).** All prior-phase test suites must pass bit-identically before the current track proceeds.
7. **Bit-identical reproducibility.** Every per-pair / per-property evaluation re-runs to confirm identical outputs.
8. **Pause-and-report.** Any structural finding triggers explicit pause; amendments are authorized only by explicit user direction.
9. **Sealed close.** Final artifacts are sealed with a summary checksum; no retroactive modification is permitted.

1.3 Definition of gates and evaluation philosophy

A "gate" is the conjunction of pre-registered acceptance criteria for a phase or track. A track PASSES if the gate is satisfied for at least one ($\Phi \times \text{CPM}$) configuration; it FAILS if no configuration satisfies the gate. Negative results are recorded as legitimate findings and do not motivate post-hoc adjustment of the gate.

Findings are designated `F-<track>-<id>` (e.g., F-A-P6-1-1, F-A-P6-2-PRE-EXEC-2) and recorded in the relevant Results document and summary JSON.

Section 2 — Phase Summaries

2.1 Phase 1 — Representation vs Capacity

Objective. Distinguish the role of feature projection (Π) from classifier-family capacity in measurement outcomes.

Method. Fix a candidate feature pool; vary projection mode and classifier family; measure under environment E1.

Gate result. Phase 1 separation criteria PASSED. Representation and capacity are separable degrees of freedom under the test design.

Key findings. Established the projection mechanism, candidate-pool methodology, and bit-identical determinism conventions used throughout PLCT.

Summary checksum. `a74bfe2a4cb387fb0797e60ea8cfd47986d06e460eeeece5356cc245ffcc957a`.

2.2 Phase 2 — Classifier Limitation

Objective. Establish whether classifier-family capacity, holding projection fixed, governs measurement at all relevant resolutions.

Method. Fix Π_{full} ; vary classifier family across linear, MLP, axis-rule families; sweep capacity bins.

Gate result. Classifier limitation PASSED — capacity bounds measurement separability when projection saturates the candidate pool.

Key findings. Required amendments A-001 (NumPy MLP — replace sklearn MLP for determinism) and A-002 (B-3 model-axis statistic refinement). Both amendments cascaded forward.

Summary location. Recorded in `PHASE_2_RESULTS.md` and merged Phase 2 artifact tree.

2.3 Phase 2.x — Measurement Geometry Limitation

Objective. Characterize the residual measurement structure not explained by Phase 1 / 2 (geometric-representation residual).

Method. Capacity-and-binning sweep with fixed-projection control under A-002.

Gate result. Measurement-geometry limitation PASSED with finding F-A-002-1.

Key findings. Geometric-representation residual is non-trivial and not eliminated by capacity scaling.

Summary checksum. `1c78cbc5f58c332a21a97c6b4176e481f4bc9df76773d4b7313949496bb576d4`.

2.4 Phase 3 — Method-set Limitation

Objective. Test whether measurement outcomes are limited by the choice of measurement method (over the method set rather than over capacity).

Method. Density-based and classifier-based measurement methods compared on E2 Π_{full} ; refinement R-P3-1 introduced bin-density tooling.

Gate result. Method-set limitation PASSED. Method choice contributes a non-trivial axis of measurement.

Key findings. Stage 2 produced finding F-P3-1; refinement R-P3-1 stabilized density estimation methodology. PRP and LVS family CPMs introduced.

Summary checksum. `583495d7bcccd69987c8534b64c3094b987dbae11f698c637dc2ad5950d163e`.

2.5 Phase 4 — Measurement-Construction Validation (post-A-P4-1)

Objective. Validate the measurement-construction (CPM) pipeline; surface calibration / leakage signals.

Method. OOF (out-of-fold) construction, two CPM methods (LVS leaf-value-stratification, PRP perturbation-response), Π_{full} on E2.

Gate result. Validation PASSED post-amendment with calibration collapse and leakage signal both observed.

Key findings. Amendment A-P4-1 corrected a latent leaf-deletion bug discovered during Phase 6 execution; the fix cascaded through Phases 4, 5, 6 with full re-verification. Findings preserved in `AMENDMENT_A_P4_1.md`.

Summary checksum. `2508077950639c85a406383eef4c78ed079d4553123f51a595679580d78e5fc`.

2.6 Phase 5 — Calibration Replacement (post-cascade)

Objective. Test whether calibration can be replaced (rather than corrected) by the leakage-signal mechanism surfaced at Phase 4.

Method. Direct calibration-replacement protocol on E2 Π_{full} under post-A-P4-1 LVS and PRP.

Gate result. Calibration-replacement structurally FAILED. The anomaly is real and confirmed; attribution is deferred (not solved by Phase 5).

Key findings. The replacement protocol does not converge to a usable calibration; Phase 5 closes with the structural failure recorded but un-explained.

Summary checksum. 099dabc7815d893fc76babb7bf10b6592a9a95464cd7a2a239a99c52feaf5e83.

2.7 Phase 6 — Dynamic Self-Referential Measurement Stability

Objective. Establish whether any ($\Phi \times$ CPM) configuration produces dynamic measurement stability under iterated self-referential modulation.

Method. Per-sample additive modulation with three Φ operators (Φ -1 exponential memory $\alpha = 0.9$, Φ -2 multiplicative, Φ -3 hard norm projection) across LVS and PRP CPMs on E2 Π_{full} at single seed 20260425.

Trajectory length $T = 50$.

Gate result. Gate 6 PASSED for **2 of 6 pairs**: Φ -1 \times PRP and Φ -3 \times PRP. All LVS pairs and Φ -2 \times PRP fail.

Key findings.

- F-P6-1: latent Phase 4 LVS bug (resolved via A-P4-1 cascade).
- F-P6-2: PRP $>$ LVS on dynamic stability across the bound Φ set.
- F-P6-3: Φ -2 (multiplicative) is structurally unstable on this configuration.
- F-P6-4: two distinct stability mechanisms work under PRP — exponential damping and hard norm projection.
- F-P6-5: signature tolerance interacts with steady-state behavior at the bound τ .

Summary checksum. 0864771677bc998ab1cf5a5bce729ca96149833051d77cf69eb11a922268c61d.

Section 3 — Amendment Tracks

3.1 A-P6-1 — Tetrahedral State + Fractional Memory + Geometric Diagnostics

Objective. Test whether a framework-specific lift of Phase 6 — replacing per-sample-scalar state with per-sample 4-channel tetrahedral state, adding a Caputo / Grünwald-Letnikov fractional memory operator (Φ -4), and gating on geometric non-degeneracy + edge-norm boundedness — preserves Phase 6's stability.

Configuration (v3 frozen, signed).

- Tetrahedral basis: regular tet on cube diagonal, $v_k = (\pm 1, \pm 1, \pm 1) / \sqrt{3}$.
- Per-sample 4-channel state $r_k(t)[i]$.
- Centroid-norm projection $\pi_T(r)[i] = \|(1/4) \sum_k r_k v_k\|_2$.
- Caputo / GL Φ -4 with $\alpha = 0.8$, FFT-based GL convolution (numpy.fft).
- Forcing $force_k(t)[i] = (residual)[i] \cdot g_k - \lambda_c \cdot r_{((k+1) \bmod 4)}(t)[i]$ with $g = (1, -1,$

2, -2) and $\lambda_c = 0.1$.

- Strict gate: $v_{\min}(t) > v_{\text{floor}} = 1e-9$ for all $t \geq 1$; $e_{\max}(t) \leq 10 \times e_{\max}(1)$; signature stability; constraint adherence; etc. (10 checks per pair).

Pre-execution structural findings. Three iterations were required before Stage 2 execution:

- **F-A-P6-1-PRE-EXEC** ($v1 \rightarrow v2$): forcing without coupling produces $V \equiv 0$ by g-proportionality. Resolved via Path 3 cross-channel coupling.
- **F-A-P6-1-PRE-EXEC-2** ($v2 \rightarrow v3$): cyclic-shift coupling on $g = (1, -1, 1, -1)$ preserves the g-line by permutation symmetry. Resolved via Path B amendment to $g = (1, -1, 2, -2)$.
- **F-A-P6-1-PRE-EXEC-3** ($v3$ advisory): V_{\min} margin narrow on real data; recorded but not blocking per Ivan's signed direction.

Gate result. Gate A-P6-1 FAILED. 0 of 6 pairs satisfy all 10 acceptance checks under $v3$ bindings. All 6 pairs are bit-identically reproducible; $V_{\min} = 0$ fires on every pair (geometric non-degeneracy).

Stage 2/3/4 findings.

- F-A-P6-1-1: geometric non-degeneracy fails on all 6 pairs.
- F-A-P6-1-2: signature stability fails on all 6 pairs (σ_{\max} / τ ratio $5 \times -80 \times$).
- F-A-P6-1-3: constraint adherence fails on 4/6 pairs.
- F-A-P6-1-4: $\Phi-4$ fails no_oscillation on both CPMs.
- F-A-P6-1-5: **Phase 6 PASS pairs regress under A-P6-1.** $\Phi-1 \times \text{PRP}$ and $\Phi-3 \times \text{PRP}$, both Phase 6 Gate-6 PASSes, fail Gate A-P6-1.

Interpretation (recorded). "A-P6-1 failed because the tetrahedral / fractional lift was not first certified as an admissible closed manifold under Φ . The failure is a valid geometric / admissibility finding, not an implementation failure." This interpretation motivated A-P6-2.

Summary checksum. 9214b0ce07d8ca5d473529302cd7e5c65026d26af0fd7a42ff68904e1519608d (sealed negative result).

3.2 A-P6-2 — Admissible Tetrahedral Dynamics Certification

Objective. Certify whether the bound A-P6-1 $v3$ dynamics admit a non-trivial admissible manifold M_{adm} such that $\Phi(M_{\text{adm}}) \subseteq M_{\text{adm}}$ under closure, non-degeneracy, constraint-boundedness, geometric continuity, and measurement compatibility — with mutual-alignment invariants verified and boundary-stress numerical evidence supplied.

Method. Per-tetrahedron certification ($n = 1$, hybrid Q-AC-6.c) under the bound (Φ , CPM) matrix from A-P6-1 $v3$. Ten Q-AC bindings + four refinement bindings. Six stages:

- **Stage 0:** pre-certification analytic verification (cyclic-permutation check; S_{GL} value; π bounds; operator definedness; geometric ceiling).
- **Stage 1:** regression lock against all 15 prior-phase test suites including A-P6-1.
- **Stage 2:** analytic certification per property \times per Φ .
- **Stage 3:** uniform-rejection interior sampling, $N_{\text{initial}} = 200$; admissibility filter; per-pair Φ evaluation under $K_{\text{residual}} = 5$ random residuals.
- **Stage 3.5:** Lipschitz check ($\epsilon = 1e-4$, $K = 1$ perturbation, $L = 5$).

- **Stage 4:** boundary stress sampling (12 per regime \times 4 regimes = 48 samples) for $C \approx C_{\max}$, $V \approx V_{\text{floor}}$, $\pi \approx \pi_{\max}$, $\pi \approx \pi_{\min}$.
- **Stage 5:** non-triviality verification per pair ($N_{\text{pass}} \geq 20$, diameter $\geq d_{\min} = 1.0$, $\sigma_{\min} \geq 1e-6$).
- **Stage 5.5:** joint-CPM consistency (A-2) at $n = 4000$ — per pair where $N_{\text{pass}} \geq 20$.
- **Stage 6:** certificate closure (per-pair issued / not issued) + Mathematical Certificate + Numerical Evidence Report.

v1 / v2 RSP iteration. v1 was paused at smoke-test stage upon F-A-P6-2-PRE-EXEC-2 ($\pi_{\max} = 10$ unreachable under $C_{\max} = 10$ because the operator norm of the centroid map is exactly 5.7735). v2 amended $\pi_{\max} = 5.7735$ (geometric ceiling) and was executed.

Gate result. A-P6-2 PASS — 4 of 6 pairs CERTIFIED.

Pair	N_pass	Diameter	σ_{\min}	A-2 (joint)	CERTIFIED
$\Phi-1 \times \text{LVS}$	149	28.872	4.96e+01	✓	✓
$\Phi-1 \times \text{PRP}$	143	28.912	4.24e+01	✓	✓
$\Phi-3 \times \text{LVS}$	62	32.468	2.45e+01	✓	✓
$\Phi-3 \times \text{PRP}$	58	30.625	2.72e+01	✓	✓
$\Phi-4 \times \text{LVS}$	0	0	0	(n/a)	✗
$\Phi-4 \times \text{PRP}$	0	0	0	(n/a)	✗

Certificate summary (A_P6_2_CERTIFICATE.md, SHA-256

2c3d27bf6529e627a6a1baffffdb2d3d5f953e33c49bca38c8b4d885e537bc626): $\Phi-3$ receives an analytic A-1 (constraint preservation) PASS by per-channel clip construction; $\Phi-1$ and $\Phi-4$ fail A-1 analytically (worst-case 11.1 and 30.9 respectively, vs $C_{\max} = 10$) but $\Phi-1$ receives numerical certification via typical-case behavior; $\Phi-4$ fails on every sample (catastrophic).

Evidence summary (A_P6_2_EVIDENCE.md, SHA-256

eed72bf90433fb5e7cacc25f90c525d55ada7b5ac69fc59d63826b9026318d24): 247 admissible per-tetrahedron samples (200 interior + 47 boundary), 12 of 48 boundary samples per regime, Lipschitz ratios per pair, per-property failure breakdown.

Findings.

- F-A-P6-2-PRE-EXEC-1 (advisory): $\Phi-1$ / $\Phi-4$ worst-case $\|\cdot\|_{\infty}$ exceed C_{\max} under bound s_{range} .
- F-A-P6-2-PRE-EXEC-2 (resolved v1 \rightarrow v2): π_{\max} v1 binding unreachable.
- F-A-P6-2-1: $\Phi-3$ has analytic A-1 + A-3 upper guarantee; $\Phi-1$ and $\Phi-4$ fail analytically.
- F-A-P6-2-2: $\Phi-1$ numerically certifies despite analytic A-1 fail (typical-case behavior).
- F-A-P6-2-3: $\Phi-3$ has high A-4 Lipschitz failure rate (~40%) due to per-channel clip discontinuity at boundary.
- F-A-P6-2-4: **$\Phi-4$ catastrophic admissibility failure — 0/247 samples certify** under one-step constant-history ($H = 49$) treatment.
- F-A-P6-2-5: Joint-CPM consistency (A-2) trivially holds for all 4 candidate pairs.

Explicit non-claim (RSP §8 preserved): A-P6-2 PASS does NOT reverse the A-P6-1 negative result.

Admissibility ≠ trajectory stability. $\Phi-1 \times \text{PRP}$ and $\Phi-3 \times \text{PRP}$ are admissibility-certified by A-P6-2 but failed A-P6-1 trajectory dynamics. The two are different questions: A-P6-2 certifies one-step closure; A-P6-1 tested iterated trajectory stability.

Summary checksum. `98a1dcf7b77d8fa0909b70fbddbdc4e1a70c474123a5c97d90196a79d73c181` (sealed positive result).

Section 4 — Cross-Phase Synthesis

The PLCT cycle establishes three distinct empirical claims, in order:

1. **Stability exists** (Phase 6). Under per-sample-scalar self-referential modulation, dynamic measurement stability is achievable by suitable $\Phi \times \text{CPM}$ configurations. Specifically: $\Phi-1 \times \text{PRP}$ (exponential damping under perturbation-response measurement) and $\Phi-3 \times \text{PRP}$ (hard norm projection under perturbation-response measurement) both pass Phase 6 Gate 6.
2. **Geometric / fractional lift breaks it** (A-P6-1). Replacing the per-sample-scalar state with a per-sample 4-channel tetrahedral state and adding a Caputo / GL fractional memory operator under cyclic cross-channel coupling does NOT preserve the Phase 6 stability. Both Phase 6 PASS pairs regress under the lift; all six ($\Phi \times \text{CPM}$) pairs fail Gate A-P6-1, primarily on geometric non-degeneracy ($V_{\min} = 0$ at sample-level for all pairs).
3. **Admissibility still holds locally** (A-P6-2). Despite the trajectory failure at A-P6-1, four of six ($\Phi \times \text{CPM}$) pairs do satisfy the prerequisite admissibility conditions on a non-trivial point-wise manifold M_{adm} : closure, non-degeneracy, constraint-boundedness, Lipschitz continuity (with discontinuity caveats for $\Phi-3$), projection well-definedness, and CPM consistency. The $\Phi-4$ pair does NOT satisfy admissibility — it catastrophically violates A-1 / A-3 on every tested sample.

Formal statement (recorded as cross-phase finding).

Stability requires both admissibility and temporal alignment under iteration.

Admissibility (one-step $\Phi(M_{\text{adm}}) \subseteq M_{\text{adm}}$) is a necessary but not sufficient condition for trajectory stability. Both must hold: M_{adm} must exist, and the iteration must remain temporally coherent across steps. Phase 6 demonstrated cases where both hold; A-P6-1 demonstrated cases where neither holds; A-P6-2 demonstrated cases where the first holds without the second.

The three tracks together characterize a structural decomposition that future work (outside the scope of this cycle) could address by either weakening the temporal-alignment condition or reformulating the framework so that admissibility implies temporal stability.

4.1 Cross-Phase Synthesis

From Phase 6, A-P6-1, and A-P6-2:

- Stability exists under scalar regime
- Geometric lift disrupts stability
- Admissibility remains partially valid

Formal statement:

Within the tested configurations, stability was observed only when both admissibility and temporal alignment under iteration were satisfied.

Section 5 — Methodological Contributions

The PLCT cycle developed and refined the following discipline patterns:

5.1 RSP discipline

Pre-registered Research Specification Protocol per phase / track. Each RSP enumerates objectives, gates, methods, parameters, explicit non-claims, pre-declared failure modes, and binding-question scope. Frozen at signature with SHA-256 capture; no retroactive modification.

5.2 Cascade correction pattern

A latent bug discovered downstream forces an explicit, authorized cascade through upstream artifacts before the downstream phase is permitted to proceed. The A-P4-1 cascade (Phase 4 LVS leaf-deletion fix discovered during Phase 6 execution, propagating through Phases 4 and 5 with full re-verification) demonstrated this pattern at scale.

5.3 Stage 0 pre-execution analytic verification

Introduced at A-P6-1 v3 (after two pre-execution structural failures consumed compute-cycles in earlier RSP iterations). The pattern: before Stage 1 / Stage 2 work begins, a Stage 0 analytic verification step checks that the bound configuration is mathematically capable of reaching the gate. Three pre-execution catches in A-P6-1 (algebraic $V \equiv 0$ by proportionality; cyclic permutation symmetry; V_{\min} margin narrow) and two in A-P6-2 (worst-case bounds; π_{\max} unreachable) validated the methodology.

5.4 Certificate vs Evidence separation

Introduced at A-P6-2 (Refinement 3, Q-AC-9). The two-artifact deliverable separates:

- **Mathematical Certificate** — analytic closure / preservation results, formal statement, per-pair certification verdicts.
- **Numerical Evidence Report** — sampling protocol, statistical confidence, exhaustive failure enumeration, supporting (not proving) the certificate.

This pattern allows analytic results to stand on their own merit and prevents numerical evidence from being mistakenly read as proof.

5.5 Per-tetrahedron + joint-CPM hybrid certification

Introduced at A-P6-2 (Q-AC-6.c). For high-dimensional state spaces where rejection sampling is intractable, a hybrid scheme separates per-component admissibility (computationally cheap, $n = 1$) from joint-state consistency (run separately for the inherently-joint property only). Made A-P6-2 tractable while preserving the $n = 4000$ joint check for A-2.

5.6 Single-seed invariant

All phases use seed 20260425 unchanged. Cross-seed reproducibility is explicitly out of scope. Bit-identical reproducibility is verified per-pair on the bound seed.

5.7 Documentation posture during execution

Interim execution documentation: `.md`, `.txt`, scripts, JSON only. No DOCX, no polished assembly during in-progress work. Polish at end-of-cycle (this document).

5.8 Methodological Contributions

- RSP phase discipline
- cascade correction pattern
- pre-execution structural verification
- certificate vs evidence separation
- hybrid admissibility certification

Section 6 — Non-Claims

The following non-claims are preserved across all PLCT artifacts. They are bound at the RSP level for each phase / track and re-affirmed at sealing:

1. **No consciousness claim.** No PLCT phase or amendment claims to model, validate, or refute consciousness. The "identity under self-referential measurement" framing remains an external guiding hypothesis for the program owner; it does not appear as a formal claim in any RSP, summary, certificate, or evidence document.
2. **No Phase 5 calibration solution.** Phase 5 closed with the calibration-replacement protocol failing structurally. The anomaly is recorded; attribution and resolution are deferred. No subsequent track claims to solve it.
3. **No reversal of A-P6-1 negative result.** A-P6-2 PASS for 4/6 pairs is an admissibility result. It does NOT mean those pairs pass A-P6-1 trajectory stability. **Admissibility ≠ trajectory stability.** This distinction is preserved in A-P6-2's RSP §8 and Certificate §6.
4. **Configuration-specific findings.** A-P6-1 and A-P6-2 results apply only to the bound configurations (regular-tet basis + 4-channel per-sample state + centroid-norm $\pi T + Caputo / GL \Phi-4$ with $\alpha = 0.8 + g = (1, -1, 2, -2) + \lambda c = 0.1 + LVS / PRP$ CPMs on E2 Π_{full} at single seed 20260425, under per-tetrahedron one-step admissibility with H = 49 constant history for $\Phi-4$ in A-P6-2's case).
5. **External guiding hypothesis status.** The external loop synchrony framework (Carlonosopen Journal of Coherence Intelligence, 2026 Special Edition) is the program owner's research context for PLCT. PLCT does not validate, refute, or extend that framework — it tests one specific instantiation under PLCT discipline.
6. **No general PLCT methodology claims.** The discipline pattern documented in Section 5 represents working practice within this cycle. Generalization to other research programs is not claimed.

This work:

- does NOT claim consciousness
- does NOT solve calibration universally
- does NOT generalize beyond tested configurations
- does NOT define a deployable intelligence system

The concept: “identity under self-referential measurement” is treated strictly as a **testing hypothesis**, not a design prescription.

Section 7 — Checksums (full integrity table)

All values below are SHA-256. Each is the **authoritative record-of-truth checksum** captured during PLCT execution. The redistribution package (`/plct_final/`) contains files whose SHA-256 matches these values exactly.

7.1 Phase RSPs and summaries

Track	Artifact	SHA-256	Path in package
Phase 1	summary JSON	a74bfe2a4cb387fb0797e60ea8cfd47986d06e460e0e0e5356cc245ffcc957a	results/phase1_summary.json
Phase 2.x	RSP frozen	900f43197ac4ae61994d9f5c1161bcdaae65a2913a122ef4adf6bcfe91d59445	PHASE_2X_RSP_FROZEN.md
Phase 2.x	summary JSON	1c78cbc5f58c332a21a97c6b4176e481f4bc9df76773d4b7313949496bb576d4	results/phase2x_summary.json
Phase 2.x	Amendment A-002	3ed9a1a06c9c1c507802b0d9afacd497b931efdc4703194716aac53d804a656f	PHASE_2X_RSP_AMENDMENT_A002.md
Phase 3	RSP frozen	951974f3f1ba8e36c09852ff1c8ee67958876b86933ed2e1d765ccdcdb352b2e	plct_phase3/PHASE_3_RSP_FROZEN.md
Phase 3	summary JSON	583495d7bcccd69987c8534b64c3094b987dbae11f698c637dc2ad5950d163e	plct_phase3/results/phase3_summary.json
Phase 3	Refinement R-P3-1	01ddb9f83409289aa64b13d07dfd8c8bc76946f907404c9a40ce4f2b96ebfb949	plct_phase3/PHASE_3_RSP_REFINEMENT_R_P3_1.md
Phase 4	RSP frozen	3e454ea779d23c12cdf0ee9cfd953c62025f80eb33b2f7bd7ac3e35db8cf4e	plct_phase4/PHASE_4_RSP_FROZEN.md
Phase 4	summary JSON (post-A-P4-1)	2508077950639c85a406383eefc478ed079d4553123f51a595679580d78e5fc	plct_phase4/results/phase4_summary.json
Phase 5	RSP frozen	397bfb4e28d792c3d5e2b9512828ed357aff95fd9f4a4f116d387fa440ddb96	plct_phase5/PHASE_5_RSP_FROZEN.md
Phase 5	summary JSON (post-cascade)	099dabc7815d893fc76bab7bf10b6592a9a5464cd7a2a239a99c52feaf5e83	plct_phase5/results/phase5_summary.json
Phase 6	RSP frozen	bc337f85ece85eeea9c6f94bd66cfb58d8d3cce87bc4c7865a17bb50f0a0d7b	plct_phase6/PHASE_6_RSP_FROZEN.md
Phase 6	summary JSON	0864771677bc998ab1cf5a5bce729ca96149833051d77cf69eb11a922268c61d	plct_phase6/results/phase6_summary.json

7.2 A-P6-1 (sealed negative result)

Artifact	SHA-256	Path
RSP v1 (paused)	ffb6bc7b5f0d1a234ac27f96b85e1b43ff189e7622b623dbd6b70c0767b5b8c	(historical only; not in package)
RSP v2 (paused)	8b1128c4adea6028c2f496334a00f1600a979b21e519d6ec85b1d30d6104c68b	(historical only; not in package)
RSP v3 (executed)	e045a62f80dc4cf666b725d558e447c840134d86aff1c06262a7896088965666	plct_a_p6_1/A_P6_1_RSP_FROZEN.md
Summary JSON (sealed FAIL)	9214b0ce07d8ca5d473529302cd7e5c65026d26af0fd7a42ff68904e1519608d	plct_a_p6_1/results/a_p6_1_summary.json

7.3 A-P6-2 (sealed positive result)

Artifact	SHA-256	Path
RSP v1 (paused)	24edd3638a692a7df0f3a826b4596e9fc9d31a3577f77ccab077a699d06824a6	(historical only; not in package)
RSP v2 (executed)	01a05ee297874ee1eb499e3f1b6b53f2e777efb994f1cd548f40bfb9d561629	plct_a_p6_2/A_P6_2_RSP_FROZEN.md
Summary JSON (sealed PASS, 4/6)	98a1dcf7b77d8fa0909b70fbdbbdce4e1a70c474123a5c97d90196a79d73c181	plct_a_p6_2/results/a_p6_2_summary.json
Mathematical Certificate	2c3d27bf6529e627a6a1bafffdb2d3d5f953e33c49bca38c8b4d885e537bc626	plct_a_p6_2/A_P6_2_CERTIFICATE.md
Numerical Evidence Report	eed72bf90433fb5e7cacc25f90c525d55ada7b5ac69f59d63826b9026318d24	plct_a_p6_2/A_P6_2_EVIDENCE.md

The full per-file redistribution checksum table is in `manifest.json`.

This work is released as a **measurement and evaluation framework**.

It is NOT intended:

- as a blueprint for autonomous agents
- as a real-world control architecture
- as a self-improving intelligence system

Applications involving:

- autonomous decision-making
- physical actuation
- large-scale control

must implement independent governance and safety systems.

The authors explicitly discourage use in:

- defense or military systems
- weaponized applications
- unconstrained adaptive systems

Section 8 — Reproducibility

8.1 Environment

- **Python:** 3.12.3 (verified working environment).
- **NumPy:** 2.4.4 (executed under).
- **SciPy:** 1.17.1 (executed under).
- **scikit-learn:** 1.8.0 (executed under).
- **OS:** Linux 4.4.0 (sandbox).
- **Determinism:** single-thread `numpy.fft` for FFT-based GL convolution. Seed `20260425` fixed across all phases. FFT determinism may vary across BLAS / FFT backends; in-environment verification is required for bit-identical reproduction.

8.2 Test suite

```
cd plct_final
bash run_all_tests.sh
```

Expected output: 16 test suites, all PASS. The runner invokes script-based tests (per signed direction; not pytest-discoverable). Each test is a standalone Python script that runs under `python tests/test_X.py`.

8.3 Per-phase reproduction

All Phase 6, A-P6-1, A-P6-2 reproduction commands are documented in their respective Stage records (runs/stageN_*/run_stageN.py scripts) and in the package README. Below are the canonical commands.

Phase 6 reproduction:

```
cd plct_final/plct_phase6
python runs/stage1_reference/run_stage1.py
for phi in phi1_exponential phi2_multiplicative phi3_norm_projected; do
  for cpm in cpm1_lvs cpm2_prp; do
    python runs/stage2_dynamic_evolution/run_stage2_pair.py --phi $phi --cpm $cpm
  done
done
python runs/stage2_dynamic_evolution/orchestrate_stage2.py
python merge_phase6.py
```

Expected: 2/6 pairs (Φ -1 \times PRP and Φ -3 \times PRP) PASS Gate 6. Summary JSON SHA-256 matches 0864771677bc...

A-P6-1 reproduction:

```
cd plct_final/plct_a_p6_1
python tests/test_a_p6_1_modules.py
python runs/stage1_reference/run_stage1.py
for phi in phi1_exponential phi3_norm_projected phi4_caputo_g1; do
  for cpm in cpm1_lvs cpm2_prp; do
    python runs/stage2_tetrahedral_evolution/run_stage2_pair.py --phi $phi --cpm $cpm \
      --out runs/stage2_tetrahedral_evolution/per_pair/${phi}__${cpm}.json
  done
done
python runs/stage2_tetrahedral_evolution/orchestrate_stage2.py
python merge_a_p6_1.py
```

Expected: 0/6 pairs PASS Gate A-P6-1 (all bit-identical). Summary JSON SHA-256 matches 9214b0ce07d8...

A-P6-2 reproduction:

```
cd plct_final/plct_a_p6_2
python tests/test_a_p6_2_modules.py
python runs/stage0_analytic/run_stage0.py
python runs/stage1_regression/run_stage1.py
python runs/stage2_analytic_cert/run_stage2.py
python runs/stage3_interior/run_stage3_4_5.py
python runs/stage5_5_joint_cpm/run_stage5_5.py
python runs/stage6_closure/run_stage6.py
python merge_a_p6_2.py
```

Expected: 4/6 pairs CERTIFIED. Summary JSON SHA-256 matches 98a1dcf7b77d... Certificate.md SHA-256 matches 2c3d27bf6529... Evidence.md SHA-256 matches eed72bf90433...

The provided code enables:

- phase-level reproduction
- artifact verification
- checksum validation

Important constraint:

Reproduction is limited to analysis and evaluation contexts. The system is not intended for operational deployment.

Section 9 — Conclusion

The PLCT program executed eight phase / amendment tracks (Phases 1–6, A-P6-1, A-P6-2) under a single fixed seed and a strict no-post-hoc-tuning discipline. The cycle established that:

- **Dynamic self-referential measurement stability is achievable** for specific $\Phi \times$ CPM configurations under per-sample-scalar state (Phase 6).
- **A framework-specific tetrahedral / fractional lift of those configurations does not preserve stability** (A-P6-1, sealed negative result).
- **The prerequisite admissibility condition holds locally for four of six pairs** even where iterated stability fails (A-P6-2, sealed positive result with 4/6 pairs CERTIFIED).

The cross-phase synthesis is recorded as: *stability requires both admissibility and temporal alignment under iteration. Admissibility is a necessary but not sufficient condition.*

Methodologically, the cycle developed and validated a discipline pattern of pre-registered RSPs, frozen checksums, cascade-correction-on-amendment, Stage 0 pre-execution analytic verification, certificate-vs-evidence separation, and bit-identical determinism. Three pre-execution structural findings (across A-P6-1 v1 \rightarrow v3 and A-P6-2 v1 \rightarrow v2) were caught analytically and resolved before consuming downstream compute, validating the methodology.

All artifacts are sealed at the recorded checksums. No future amendment of this cycle's results is authorized. Future work, if undertaken, would be a separate PLCT cycle with its own RSP, freeze, and signature. All phases and amendment tracks include SHA-256 verification. The `/plct_final/` package is a redistribution layer; original execution artifacts remain the record-of-truth.

End of document.

Prepared with the assistance of multiple AI systems under the direction of Ivan Silva (Carlonosopen, LLC, ORCID: <https://orcid.org/0009-0005-2284-8891>). All authoritative findings, bindings, and signed artifacts are owned by Ivan Silva. This document reflects a multi-stage development process supported by different computational tools across phases. Confidentiality posture: PLCT-isolated; public-safe distribution authorized for the artifact set documented above.