Decision-OS V6 Addendum: Evaluation Hooks for PIC Verification Note (1p)

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This note makes explicit evaluation hooks that were implicit in V6's formulation.

Purpose

PIC treats each module's contribution as a monotone state update ΔS, merged by a join $\sqcup$ and normalized by $Canon(\cdot)$. This addendum exposes evaluation hooks implied by V6: (i) order-invariance under permutation of updates, (ii) audit-agreement across independent auditors, and (iii) drift-resistance under small context perturbations—without claiming performance or truth. These hooks correspond to PIC's core requirements: join-semilattice (order-invariant merge), monotone updates, and idempotent canonicalization.

Toy example

Let the global state be $S = (sev, until, evidence)$ with an ordinal severity **PASS** < **DELAY** < **BLOCK**, a time bound *until*, and a set *evidence*. Define join:

$$(sev_1, until_1, ev_1) \sqcup (sev_2, until_2, ev_2) = (\max(sev_1, sev_2),\ \max(until_1, until_2),\ ev_1 \cup ev_2).$$

Let $Canon(S)$ normalize representation (stable ordering of *evidence*, duplicate removal, consistent timestamp format) without changing semantics. Example updates:

$$\Delta_A = (\textbf{DELAY},\ 2026\text{-}01\text{-}20,\ \{a\}), \quad \Delta_B = (\textbf{PASS},\ 2026\text{-}01\text{-}25,\ \{b\}).$$

Then $Canon(\Delta_A \sqcup \Delta_B) = Canon(\Delta_B \sqcup \Delta_A) = (\textbf{DELAY},\ 2026\text{-}01\text{-}25,\ \{a, b\})$. Idempotence holds: $Canon(S \sqcup S) = Canon(S)$.

Metrics

(1) **Audit-agreement.** For the same instance x, independent auditors i, j produce $S_i^*(x), S_j^*(x)$. Agreement rate: $A = \Pr[S_i^*(x) = S_j^*(x)]$.
(2) **Idempotence-break rate.** $B_{idem} = \Pr[Canon(Canon(y)) \neq Canon(y)]$.
(3) **Drift-resistance.** For small perturbations $\tilde{x}$ (paraphrase/context shifts), define

$$d(S, \tilde{S}) = \mathbf{1}\{sev \neq \tilde{sev}\} + \frac{|until - \tilde{until}|}{T} + \big(1 - \text{Jaccard}(ev, \tilde{ev})\big), \quad T = 7 \text{ days}.$$

Protocol (AB + cross-over)

Pre-register N instances $\{x_k\}$ and update permutations Π. For each x_k: (A) apply updates in order $\pi_1 \in \Pi$, compute $S_A^*(x_k) = Canon\Big(\bigsqcup_t \Delta S_t\Big)$; (B) apply the same updates in order $\pi_2 \in \Pi$, compute $S_B^*(x_k)$. Cross-over: swap orders (and/or swap auditors/models) and repeat to control for operator bias. Report A, B_{idem}, and R_{drift}; no performance metric is required for this note. Drift probe: evaluate each instance under 3 paraphrase/context perturbations.

Falsify

If permuting update order changes the canonical fixed point beyond tolerance ϵ in more than $p\%$ of cases, then the phase-invariance claim (as operationalized here) is rejected for that task distribution.
Operational defaults: $N = 30$, $|\Pi| \geq 6$, $\epsilon = 0$, $p = 5\%$.

Non-guarantees

This note does not guarantee truth, correctness, or performance; it only specifies hooks for comparable, order-invariant evaluation under the stated algebraic conditions. No claim is made about alignment or real-world optimality beyond these explicit hooks.