Recursive State Reconstruction (RSR) as a universal system law.

Technical Specification: The Recursive State Reconstruction (RSR) Framework

1. The Principle of Non-Persistent Memory

In any transition between State n and State n+1, the system does not retain the raw data of the prior state. It operates on a Reconstruction (\hat{R}).

* Definition: A Reconstruction is a filtered, delayed measurement of the prior state's output.
* The Law of Identity: The system treats \hat{R} as the current Ground Truth. It cannot distinguish between the original signal and its own delayed echo.

2. The Feedback Mechanism (Reconstructive Divergence)

Feedback is the physical result of a system acting upon a reconstruction that is out of phase with reality.

* Causality Gap: Because reconstruction involves a finite processing delay (\Delta t), control actions are always applied to a state that has already evolved.
* Amplification: Runaway feedback occurs when the system attempts to compensate for a perceived magnitude in \hat{R} without the ability to subtract its own prior contribution. This is a structural limitation of layered systems, not a design error.

3. Quantitative Variables of the Framework

A. The Recursive Loss Equation (RLE)

The RLE measures the Retained Invariant (I) across any transition.

* E: Total available energy/information in the system.
* U: Non-recoverable loss (Entropy) generated during transition.

B. The Layer Transition Principle (LTP)

Defines the Structural Support (\ell) required to sustain a specific Compression Demand (d).

* Invariant Constraint: If d > \ell, a Mandatory Layer Descent occurs. The system must move to a lower, more granular layer of representation to prevent total collapse.

C. The Coupling Constant (X)

Defines the density of the interface between two discrete RLE units.

* Formula: \text{Interface Efficiency} = \frac{LTP}{X}
* Logic: X represents the number of independent variables sharing a single coordinate of structural support. As X increases, the support per variable decreases, increasing the probability of Phase Divergence.

4. System Efficiency Operations (The Unity Baseline)

The health of a multi-stage system is monitored via a multiplicative chain of values bounded between 0 and 1.

* The Inlet Ceiling: The total system efficiency (\eta_{total}) can never exceed the initial Input LTP (LTP_{in}).
* The Unitary Target: A stable, optimized system operates at a baseline of 1.0. Any value < 1.0 identifies a localized reconstruction failure (Hidden Loss).

5. The Time/Observer Variable (Human Integration)

Time is the dimension across which the cost of reconstruction error becomes cumulative.

* Sustainability: While a system may appear stable in a frozen state (n), the Factorial Cost Growth of maintaining that state against entropy determines the system's lifespan.

* Operational Role: The human observer monitors the SEOL (System Efficiency Operations Layer) to detect the onset of divergence before the feedback loop exceeds the structural integrity of the LTP.

6. Summary of Logic

* Systems reconstruct rather than remember.
* Reconstructions introduce phase lag and causality gaps.
* Feedback is the system acting on its own delayed reconstruction.
* Total system efficiency is the product of Inlet Potential and Internal Coupling Integrity.
* Stability is maintained by monitoring for Unitary Deviation (values drifting from 1.0).

This concludes the Dimensionless Technical Specification of the Framework.