
Failure Modes: The Lexicon*A Canonical Vocabulary for Institutional Ledger Architecture*

Asset-only ledgers can represent ownership, but they cannot express the institutional primitives that underpin modern financial markets: obligations, encumbrance, lifecycle truth, credit, and multi-party workflows. Whenever these primitives are missing, four structural failure modes appear. These modes are universal — they emerge regardless of asset type, market design, or smart-contract sophistication.¹

1. Liquidity Illusion

Markets appear liquid because transfers are instantaneous, but the liquidity is synthetic because all participants must be fully prefunded.

Root Cause: No obligations → no credit, no netting, no deferred settlement.

Result: Markets behave like fully collateralized barter systems.

2. Unpriced Optionality

Participants gain free optionality because the system cannot express lifecycle truth or enforce state transitions over time.

Root Cause: No lifecycle primitives → no partial fills, pending obligations, or time-dependent rights.

Result: Optionality leaks into execution: MEV, ordering games, reorg risk, latency arbitrage.

3. Unsound Collateral

Collateral cannot be reused, prioritized, or encumbered in a structured way because the ledger cannot express claims or seniority.

Root Cause: No encumbrance model → no liens, no rehypothecation, no waterfall logic.

Result: Collateral becomes static, siloed, and operationally brittle.

¹ This lexicon adapts the logic of Failure Mode and Effects Analysis (FMEA), a long-standing methodology used in engineering, operational risk, and systemic risk analysis to identify structural points of failure in complex systems. Traditional FMEA examines how a system behaves when critical components are missing, mis-specified, or interacting under constraint. In institutional finance, these components are obligations, encumbrance, lifecycle truth, credit, and multi-party workflows — the primitives that make clearing, settlement, custody, and accounting possible. Asset-only ledgers omit these primitives by design, so the failure modes described here are not incidental; they are structural consequences of the substrate. This lexicon formalizes those consequences into four recurring patterns — Liquidity Illusion, Unpriced Optionality, Unsound Collateral, and Missing Obligations — providing a diagnostic vocabulary for analyzing any digital market architecture built on an asset-only ledger.

4. Missing Obligations

The ledger cannot express “who owes what to whom,” so all multi-party workflows collapse into synchronized transfers.

Root Cause: No liability layer → no clearing, no credit, no netting, no deferred settlement.

Result: Execution, clearing, settlement, custody, and accounting are compressed into a single step.

Summary

These four failure modes are not design flaws — they are structural consequences of a ledger that can represent assets but not obligations. A ledger that can express obligations, encumbrance, lifecycle truth, and credit eliminates these failure modes at the root and restores the separation of duties that defines institutional finance.

AND

5. Systemic Optionality Cascade²

The Fifth Structural Failure Mode

Definition

When a ledger cannot express obligations, lifecycle truth, or enforce non-selective unwind, unpriced optionality accumulates across the system. At the micro level, this appears as MEV, ordering games, and timing asymmetry. At the macro level, it manifests as selective unwind, cherry-picking of exposures, and cascading defaults across interconnected contracts. Without a mechanism like close-out netting to collapse obligations symmetrically, the system becomes vulnerable to chain reactions triggered by localized failures.

Root Cause

No obligation symmetry → no non-selective unwind → unpriced optionality accumulates across the network.

Because the ledger cannot enforce:

- termination symmetry
- valuation symmetry
- sequencing symmetry
- obligation consolidation

² For further insight on this see: Iversen, A.T. (2026, Substack) “*From Property to Collateral —How Modern Finance Multiplies Claims*” <https://annaiversen.substack.com/p/from-property-to-collateral>

...each participant retains implicit optionality over how and when obligations are recognized, enforced, or ignored.

Result

Micro: Optionality leaks into execution: MEV, reorg risk, latency arbitrage, ordering asymmetry.

Macro: Optionality leaks into the obligation network: selective unwind, cherry-picking, cascading defaults, systemic contagion.

The absence of a netting/finality layer means the system cannot collapse exposures into a single obligation at default, so failures propagate outward through the network.

Summary

Systemic Optionality Cascade is the macro-scale expression of unpriced optionality. It emerges whenever a ledger cannot enforce non-selective unwind or collapse obligations symmetrically. Traditional finance eliminates this failure mode through close-out netting and settlement finality. Asset-only ledgers cannot implement these mechanisms, so optionality accumulates until it expresses as instability — first locally, then systemically.