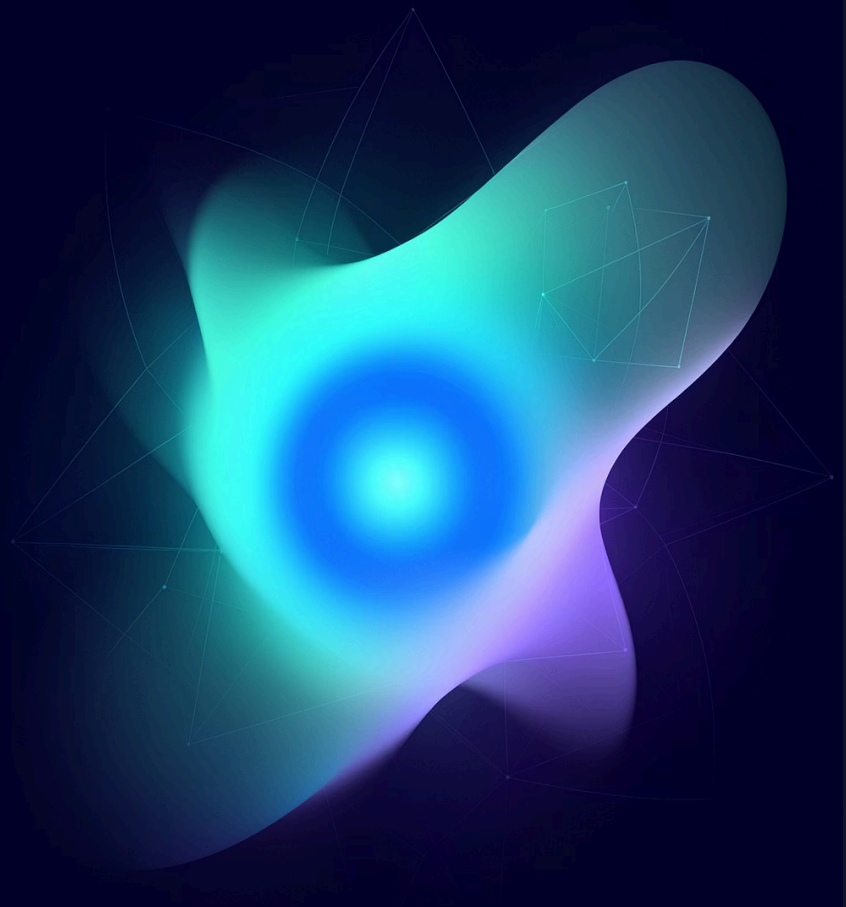
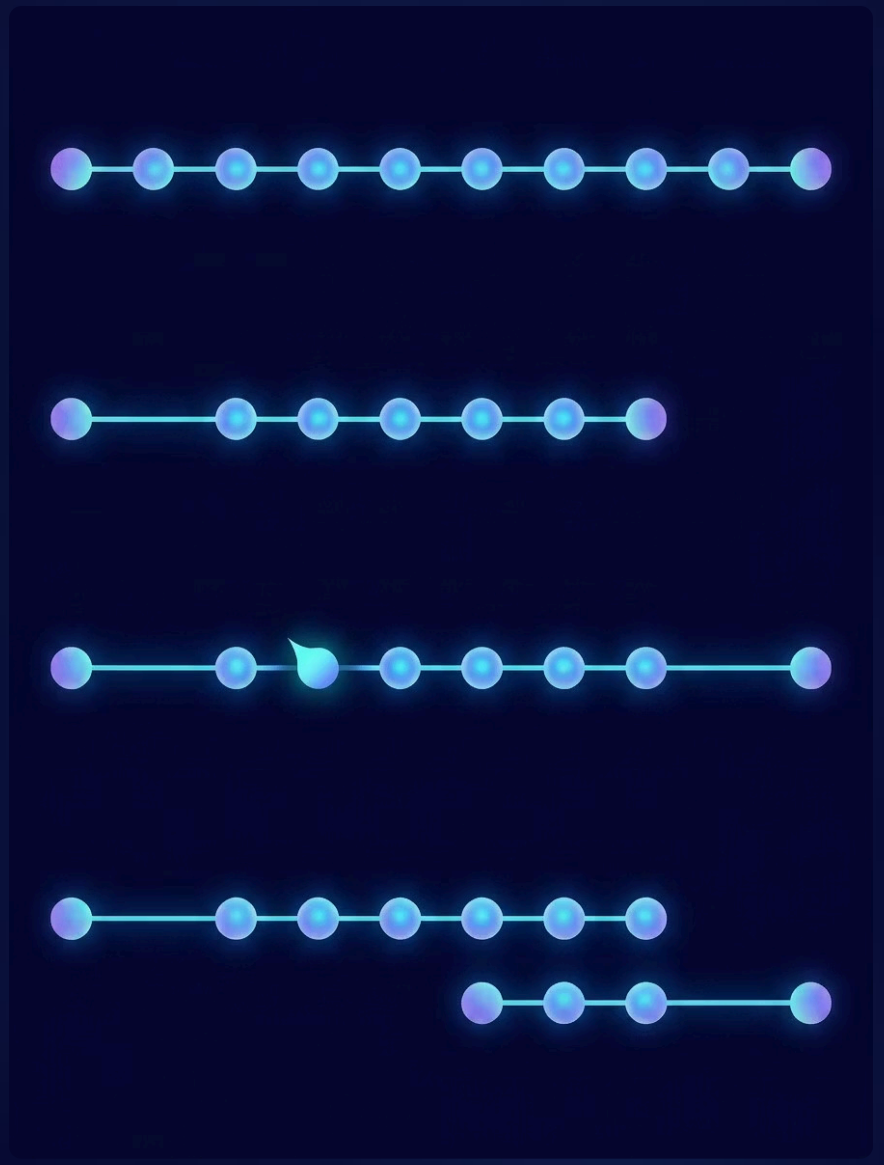


Crypto XVA: How We Changed the Way We Measure Risk

From bilateral ledgers to a framework built for programmable finance.



The old way was simple.

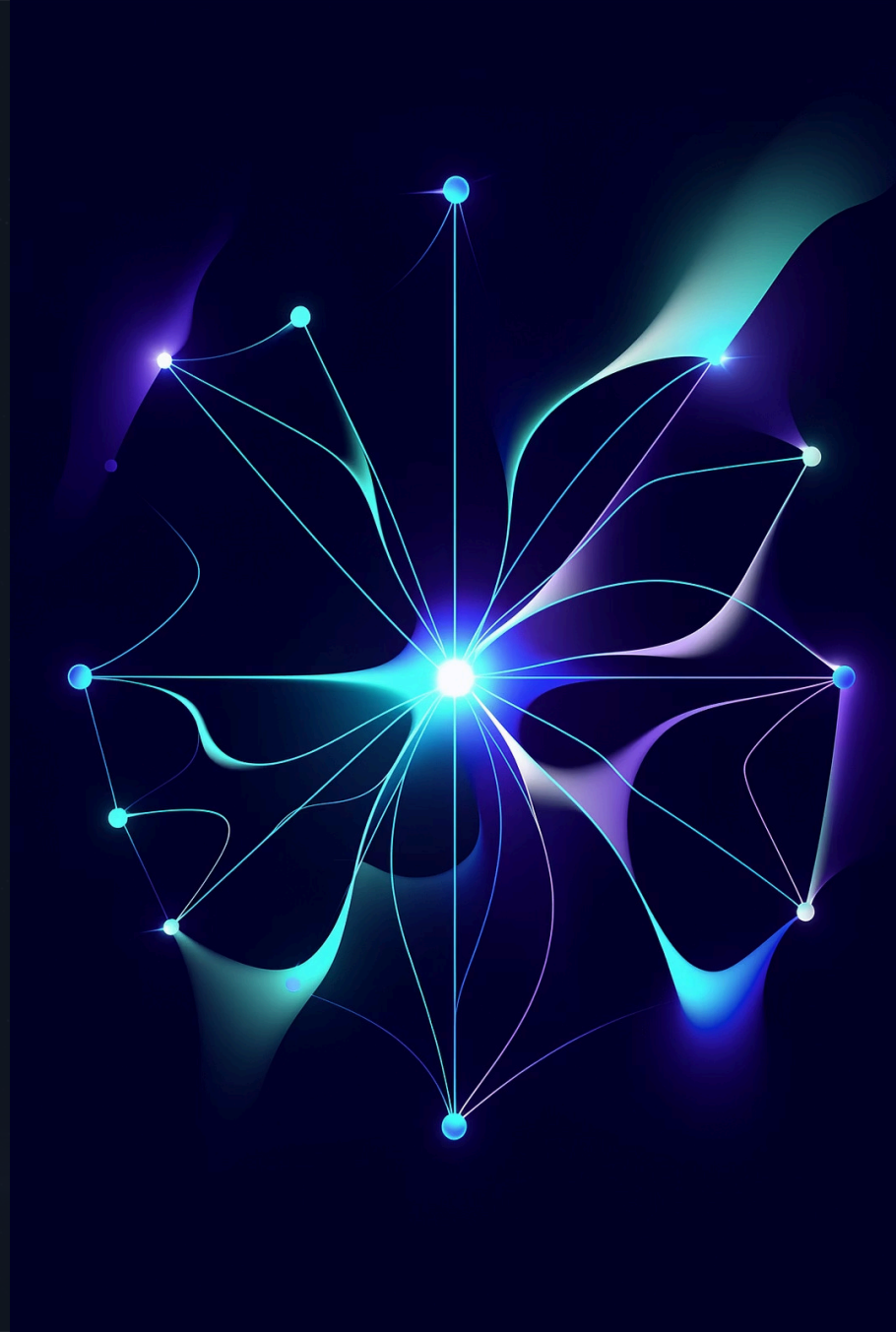
Before 2008, risk worked like a balance sheet: measure each counterparty relationship separately, sum the exposures, and check that no single number was too big. If every line was within limits, the model said you were fine.

⚠ The problem: it looked at each relationship in isolation. It had no way to see the whole shape.

A firm can be inside every limit and still be the problem.

In 2008, some institutions weren't individually overleveraged — they were **structurally central**. Every other firm's trades routed through them. When one failed, the problem wasn't the size of any single exposure; it was that removing one node disconnected the whole system.

⊗ Bilateral ledgers couldn't see that. The shape of the network was invisible to the tools designed to measure it.



The fix: measure how everyone is connected, not just each exposure.

After 2008, risk frameworks evolved to treat markets as networks — nodes, edges, and structure understood as a whole.

Who is connected to whom

Map every counterparty relationship as an edge in a living graph, not a row in a ledger.

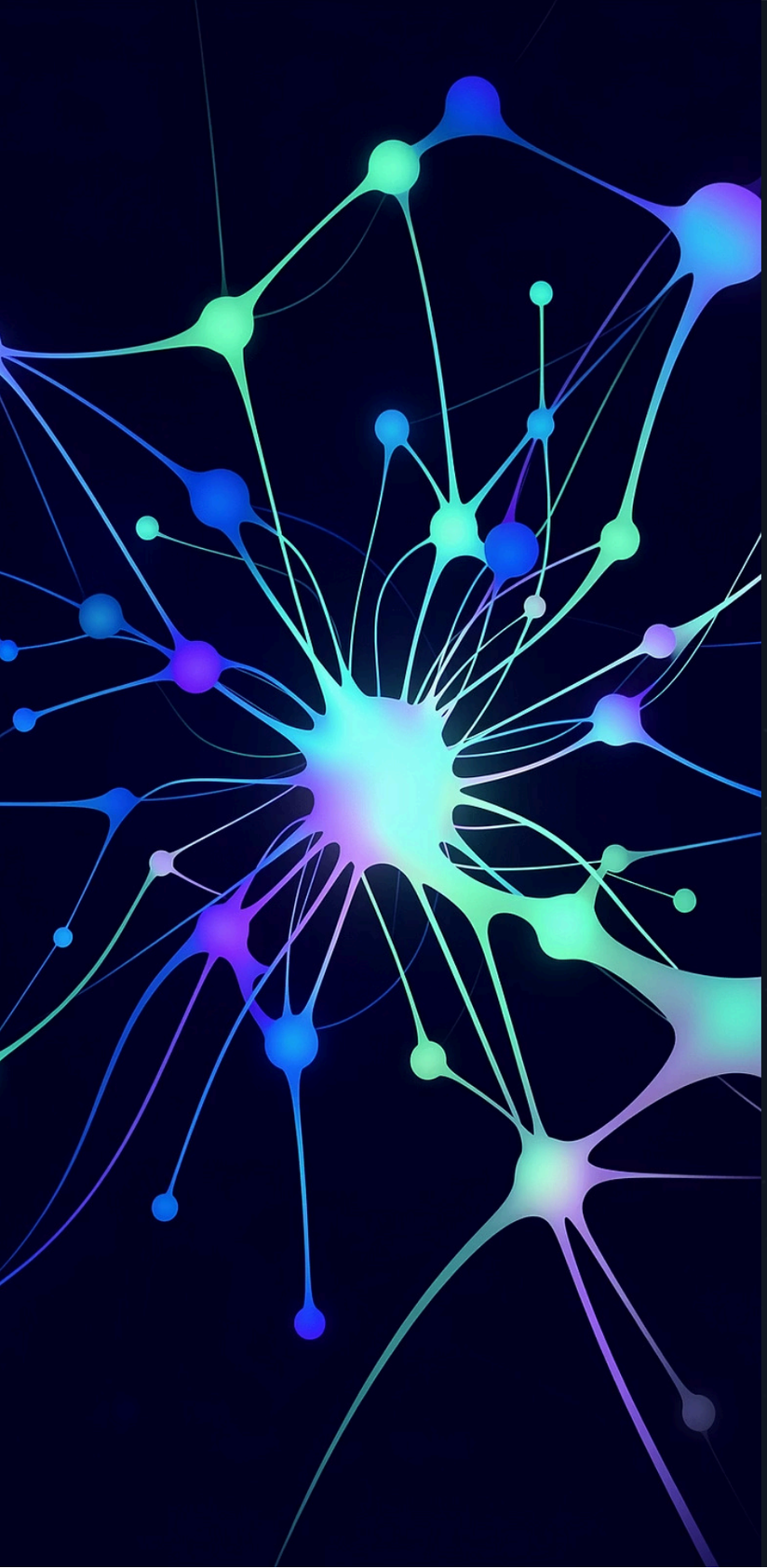
How many paths run through a firm

Betweenness and centrality metrics reveal structural importance that bilateral sums cannot.

What happens if one node disappears

Simulate removal. Measure contagion. Understand the system's fragility before it breaks.

A genuine advance — and still the baseline for serious systemic-risk thinking.



Eigenvector centrality: you're risky not just by size, but by who you're connected to.

Not just how many connections you have, but how **important** they are. Counterparties deeply embedded in the system make you more dangerous than the same number of connections to small players — importance flows through the network.

Precisely: a node's score is proportional to the sum of its neighbours' scores — the same mathematics as PageRank.

Bonacich, 1972

The mathematical foundation — centrality as a function of neighbours' centrality.

PageRank, 1998 (Page and Brin)

The same eigenvector logic applied to the web — importance propagates through links.

Post-2008 recognition

This mathematics describes systemic financial risk. Size stopped being a reliable proxy.

Reflexivity: a move changes your neighbours, which changes you.

Financial networks aren't static — the relationships react to what participants do.

1

Large firm cuts a crowded trade

A significant position unwind begins, moving prices in the market.

2

Prices move, others react

Other firms' positions shift. Their models trigger further cuts.

3

The network responds to itself

Model parameters are endogenous to the positions they're meant to measure.

⚠ A model fit on data from before a major market-structure change can be systematically wrong after it. Calibration is never a one-time event.

In programmable finance, the connections form and dissolve inside a single transaction.

The old assumption

Every move so far assumed the network changes slowly enough to snapshot, analyse, and act on. Programmable finance breaks that assumption.

Composability + Atomicity

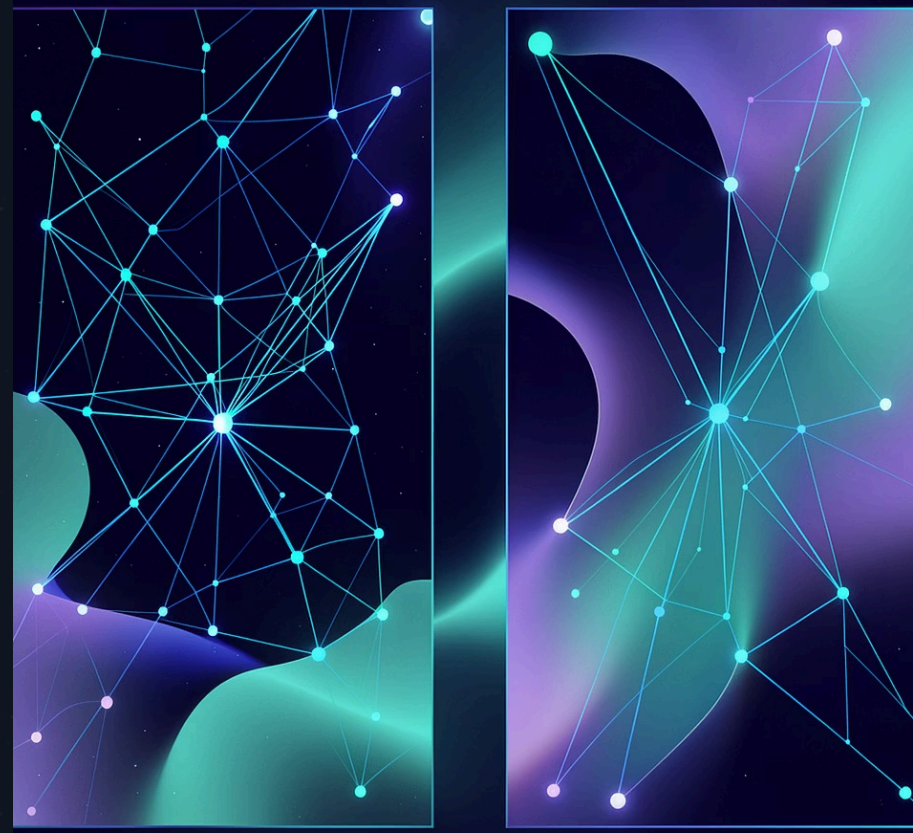
In crypto markets, transactions are composable — protocols snap together like building blocks — and **atomic**: the whole deal completes, or reverts entirely, with no partial states.

The measurement problem

A new exposure can form, amplify, and close faster than any measurement cycle can track.

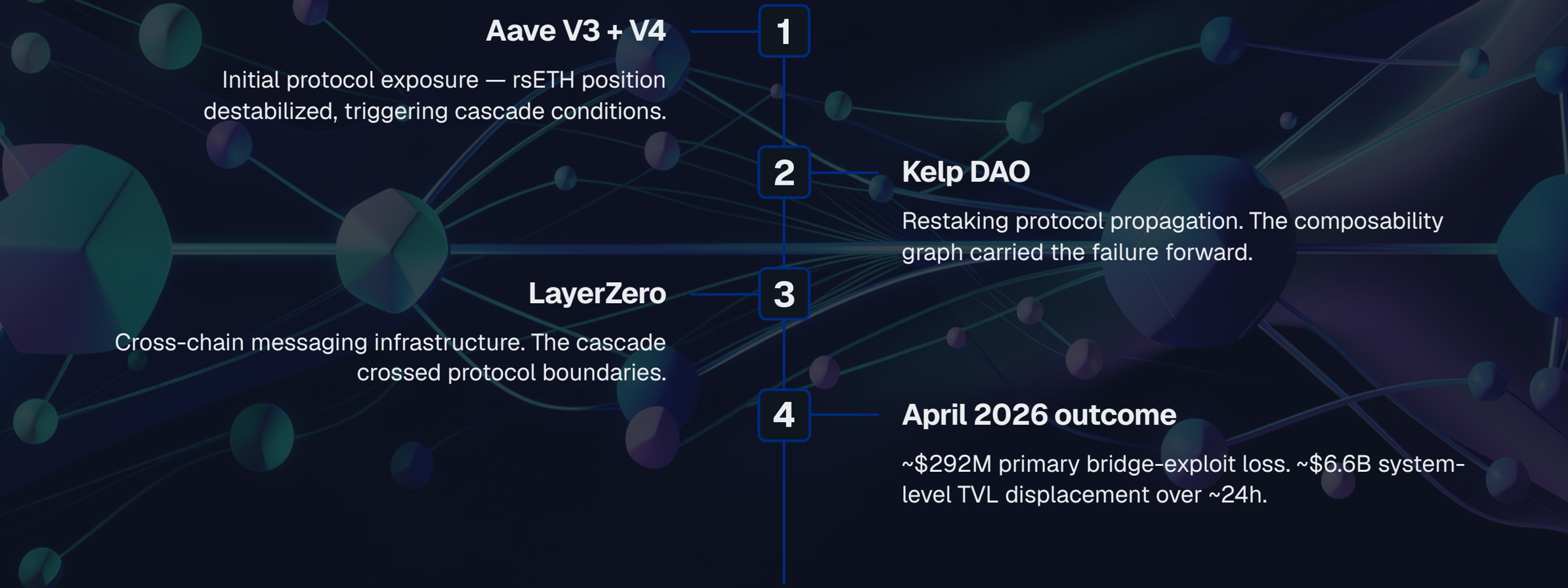
When you measure a static photo of a network that rewrites itself mid-transaction, you're not measuring the network —

> You're measuring its residue.



The order things happen in is the risk.

In a composable, atomic transaction chain, path matters in a way it didn't before. A bridge exploit doesn't unfold like a slow bank run — it propagates algorithmically, across protocols, in the sequence baked into execution.



Sources: LayerZero Labs KelpDAO Incident Statement (Apr 19 2026, ~$290M primary loss); Aave Governance Forum rsETH Incident Report (Apr 20 2026); ~$6.6B is Aave V3+V4 aggregate TVL displacement over ~24h (DeFiLlama, via CoinDesk / Unchained) — not a realized loss. LayerZero's role is cross-chain messaging infrastructure, not a lending venue.

This is why measurement has to be continuous and what Crypto XVA is built to do.

Each development made measurement harder and more necessary. The progression is cumulative:

01

Bilateral sums

Missed the shape entirely — each relationship measured in isolation.

02

Network models

Added topology — who connects to whom, how paths flow through the system.

03

Eigenvector centrality

Added the importance of connections. Not just count, but quality of neighbours.

04

Reflexivity

Added endogenous feedback, the model's subject changes in response to the model.

05

Composability

Added the dimension of time — transactions that rewrite the network inside a single block.

Crypto XVA decomposes programmable-finance risk into measurable components — including oracle pricing, liquidity routing, bridge exposure, governance risk, stablecoin reserve stability, and cross-protocol propagation — and prices each one on a **continuous-monitoring cadence**. The direction of the framework is non-stationary graph measurement: capturing not just the network's state at a point in time, but the dynamics of how it changes.

Crypto XVA

The same valuation discipline that transformed derivatives risk between 2008 and 2014 — building a measured number for counterparty, funding, capital, and collateral — applied to the new risk surfaces programmable finance creates.

Oracle Pricing

Continuous measurement of price feed integrity and manipulation exposure.

Liquidity Routing

Dynamic tracking of liquidity depth and routing risk across venues.

Bridge Exposure

Cross-chain messaging risk priced and monitored in real time.

Governance Risk

Protocol parameter change risk quantified as a valuation component.

Built to measure what snapshots miss.

Full methodology: SSRN papers.ssrn.com/abstract=6448638 · archived at Zenodo doi.org/10.5281/zenodo.20076743