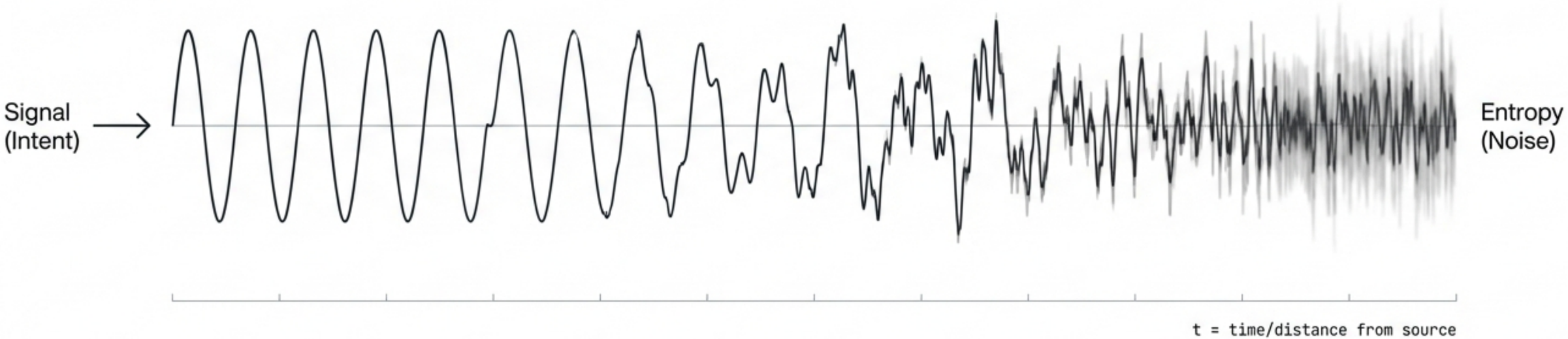
Data Physics and the Semantic Capture of Intent

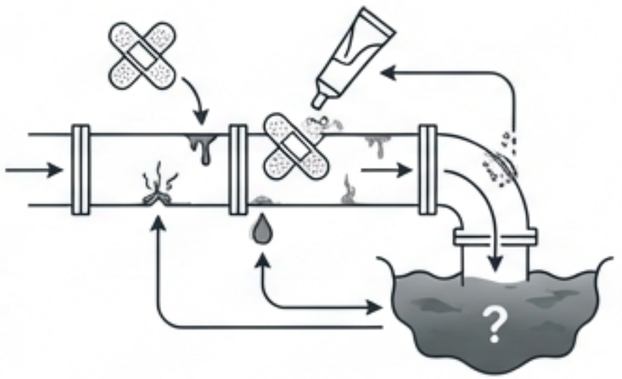
Why we stopped building software and started fighting entropy.



We have spent decades building software under the assumption that data is static. We were wrong. We are now entering an era where we must acknowledge data as a dynamic entity subject to physical laws.

The Consensus Shift from Management to Physics

The Old Era: Data Management

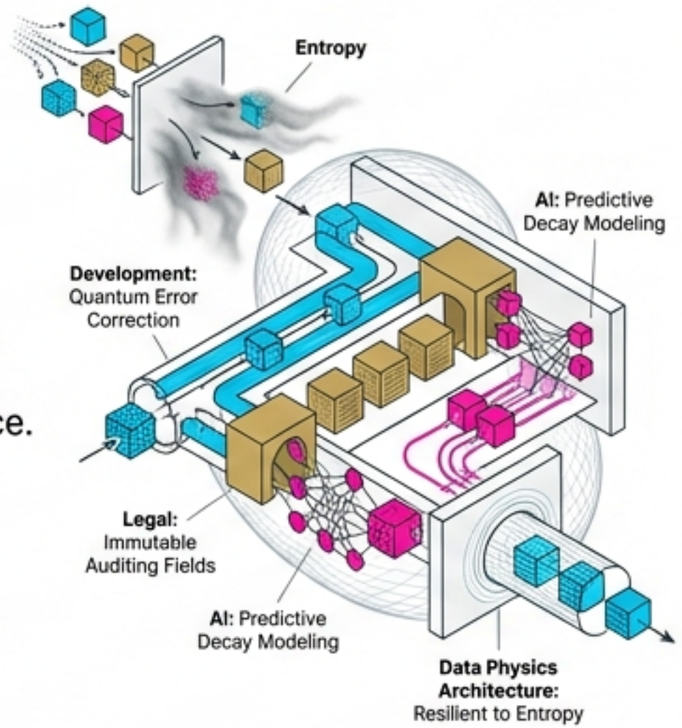


Views data issues as bugs to be fixed.

Focuses on patching pipelines, cleaning lakes, and retroactive governance.

Assume stability.

The New Era: Data Physics



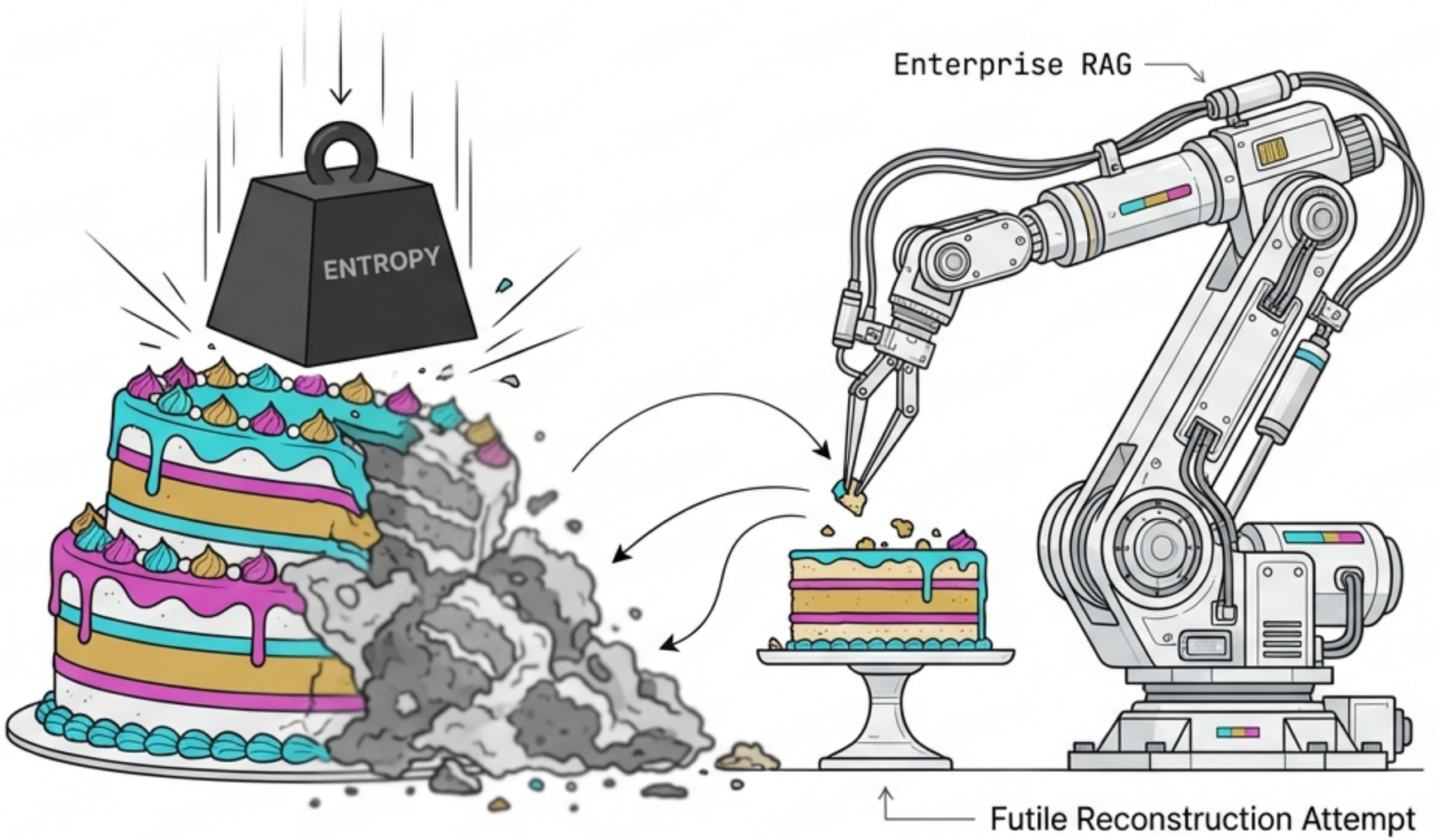
Views data degradation as Entropy—a fundamental force of chaos that erodes meaning the moment it leaves the source.

Data loss is not accidental; it is inevitable unless the architecture is designed to withstand the laws of physics.

Assume degradation.

Key Insight: We are moving from fixing leaks to understanding fluid dynamics.

We are Spending Billions Trying to Un-Bake the Cake



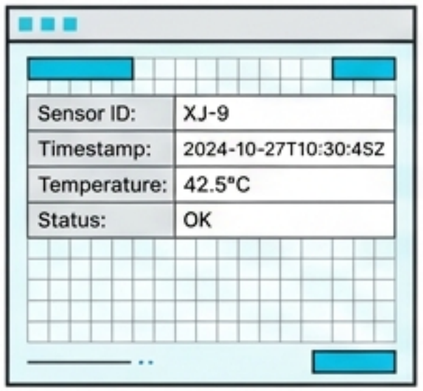
Entropy is the force of chaos. In the enterprise, this manifests when we strip context from data.

Once the ingredients are mixed and baked, you cannot separate them.

Current enterprise architecture is an expensive attempt to reverse this irreversible process.

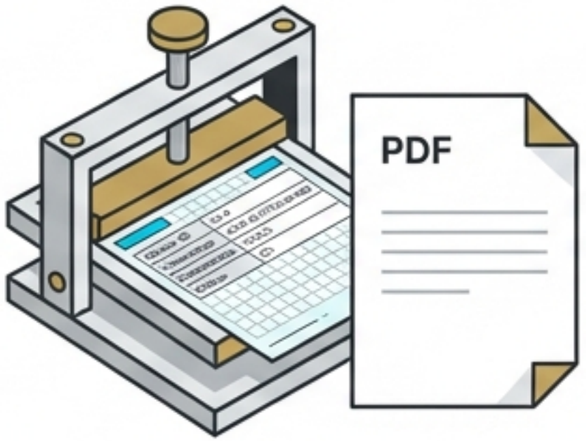
The Fallacy of Unstructured Data

Stage 1: Birth



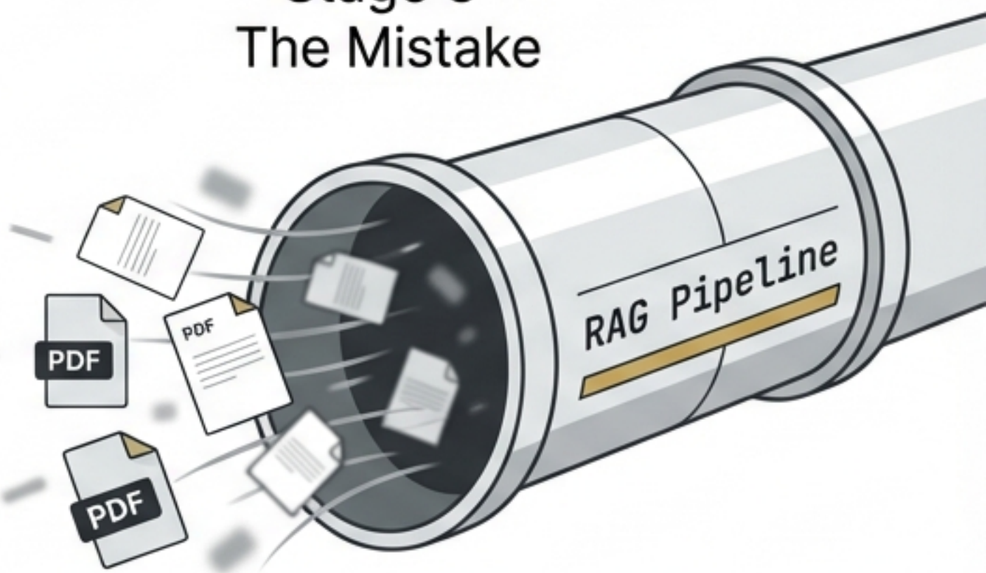
Born Structured

Stage 2: Compression



Compressed for Humans

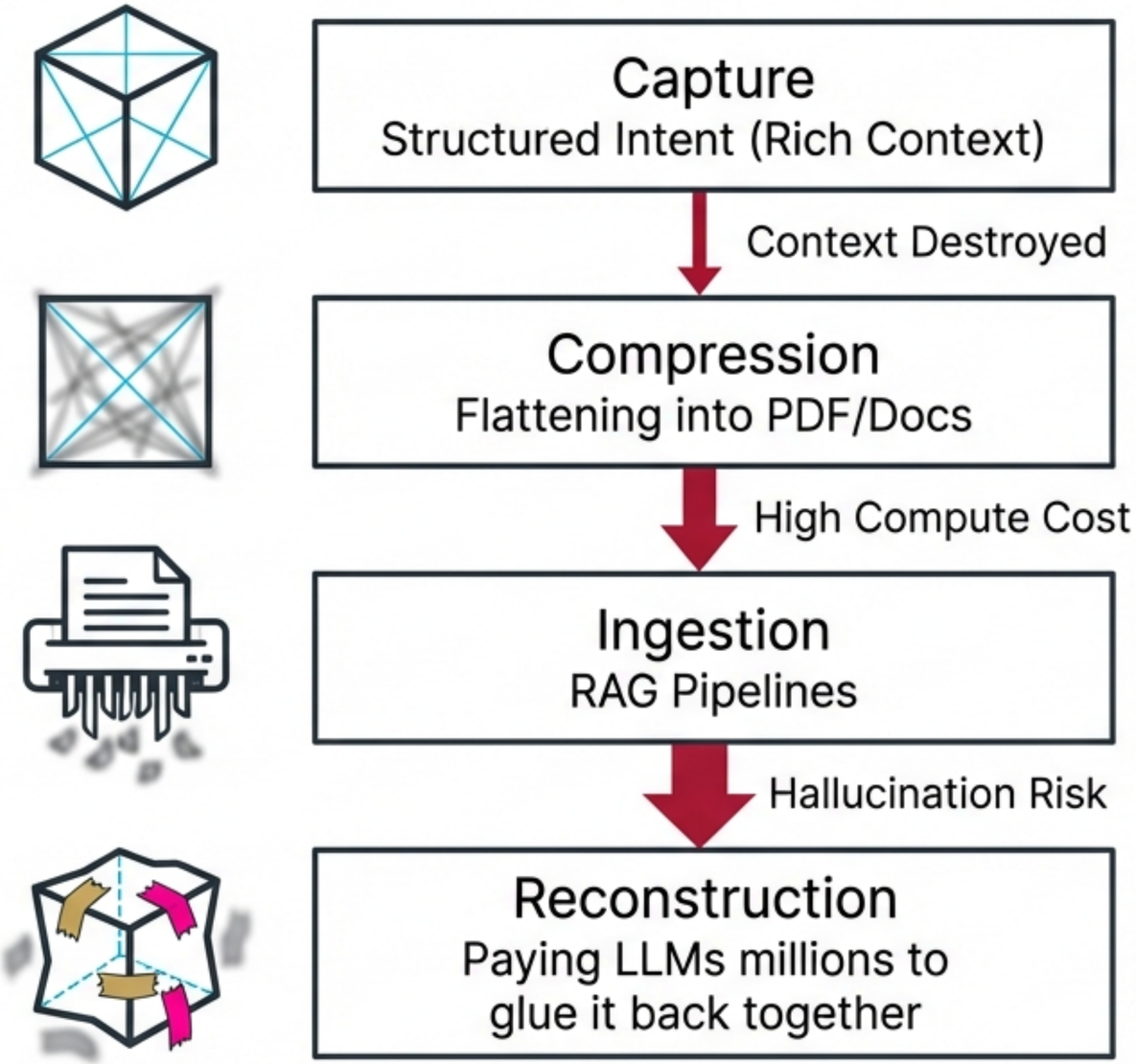
Stage 3: The Mistake



We create “unstructured” data by compressing it into documents (PDFs, emails, reports) for human consumption. We strip away metadata to make it readable for people, thereby destroying its value for machines.

The Industry Mistake: We are building pipelines to ingest documents, hoping AI can reconstruct the meaning we intentionally deleted.

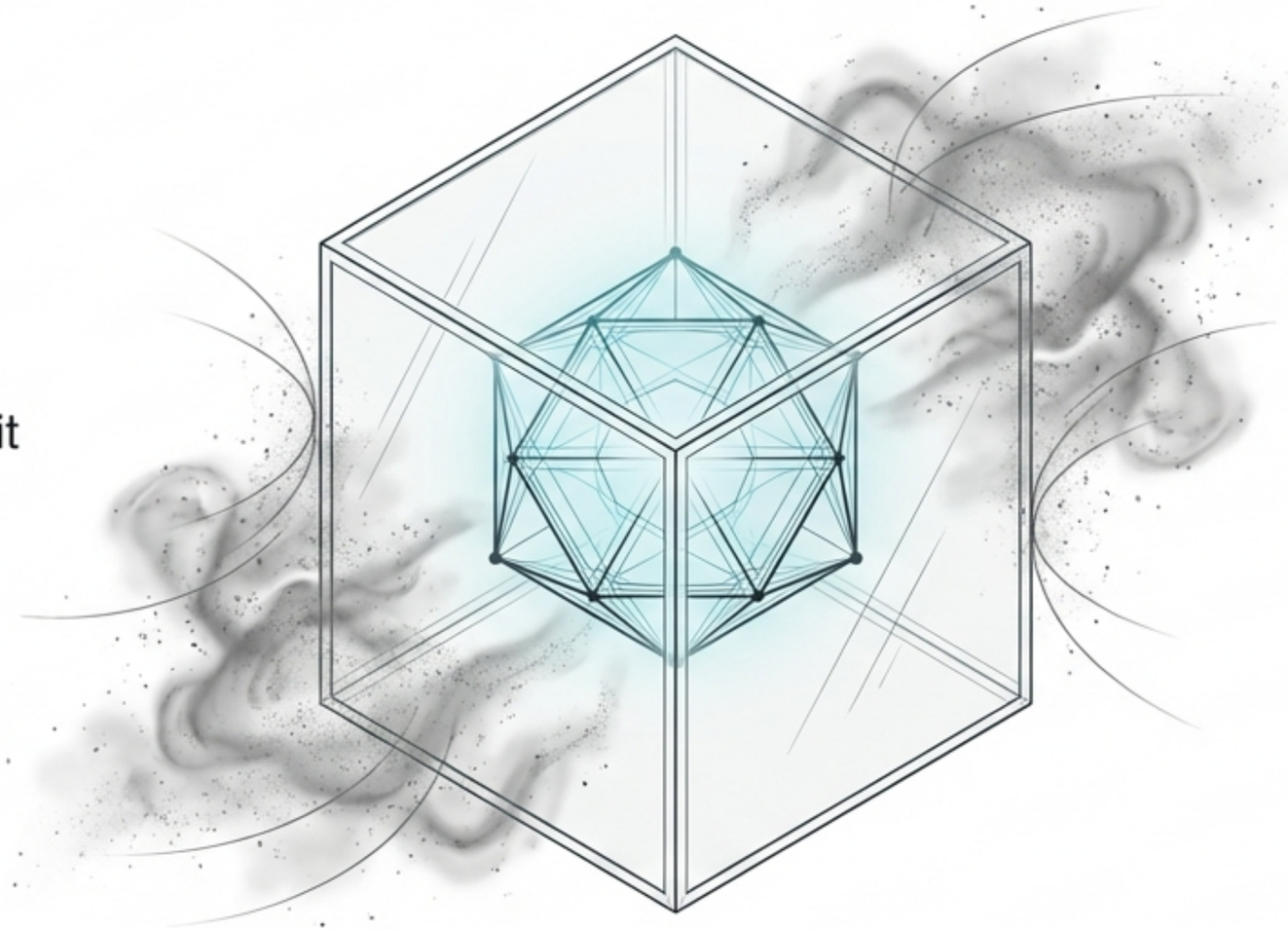
The Cost of Reconstruction



We are breaking the data, then paying to fix it.

The Fix is Preservation in the Native Semantic State

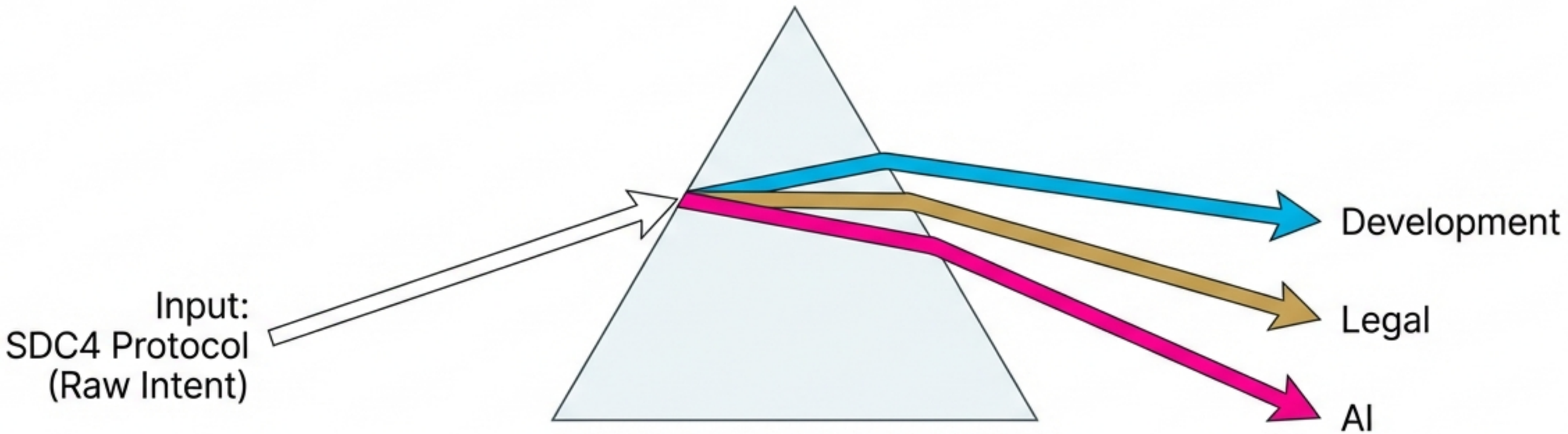
Stop fighting entropy downstream. Prevent it upstream.



Capture the data in its Native Semantic State.

If we preserve the structure at the moment of capture, we eliminate the need to hallucinate context later.

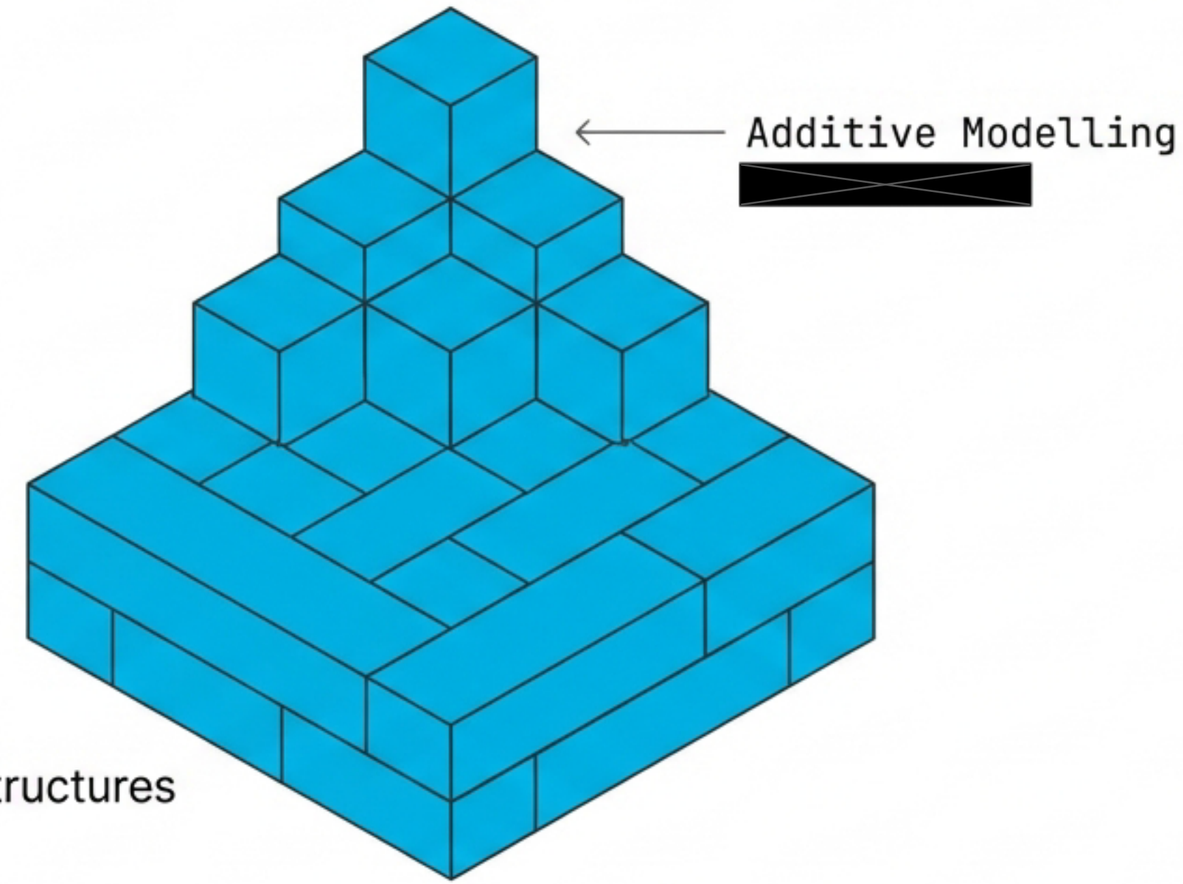
The SDC Protocol Acts as a Prism



One input. Three architectural outputs.

The Cyan Beam: Zero-Cost Evolution

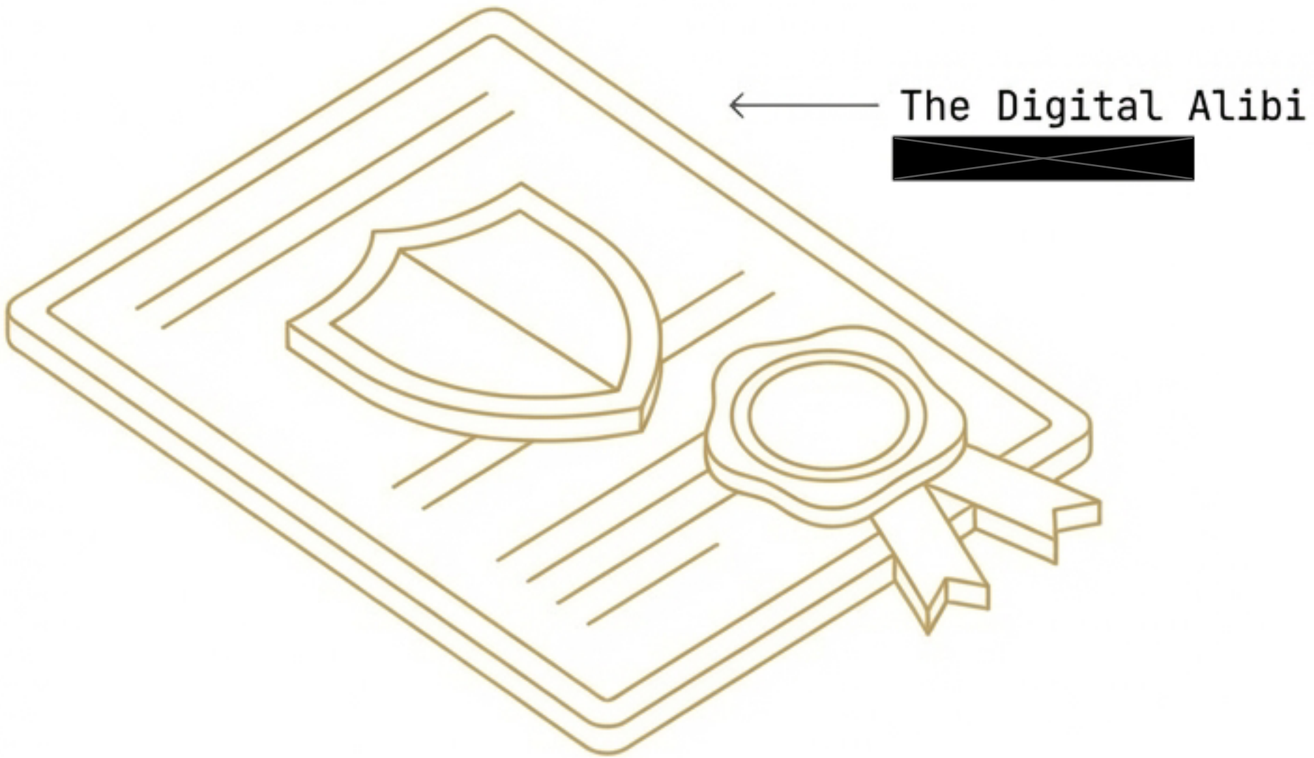
Target: CTO / Engineering Leads



Because the system is semantic, new requirements are added without breaking existing structures. You never have to refactor an API or migrate a schema again. The architecture evolves without destruction.

The Gold Beam: The Liability Shield

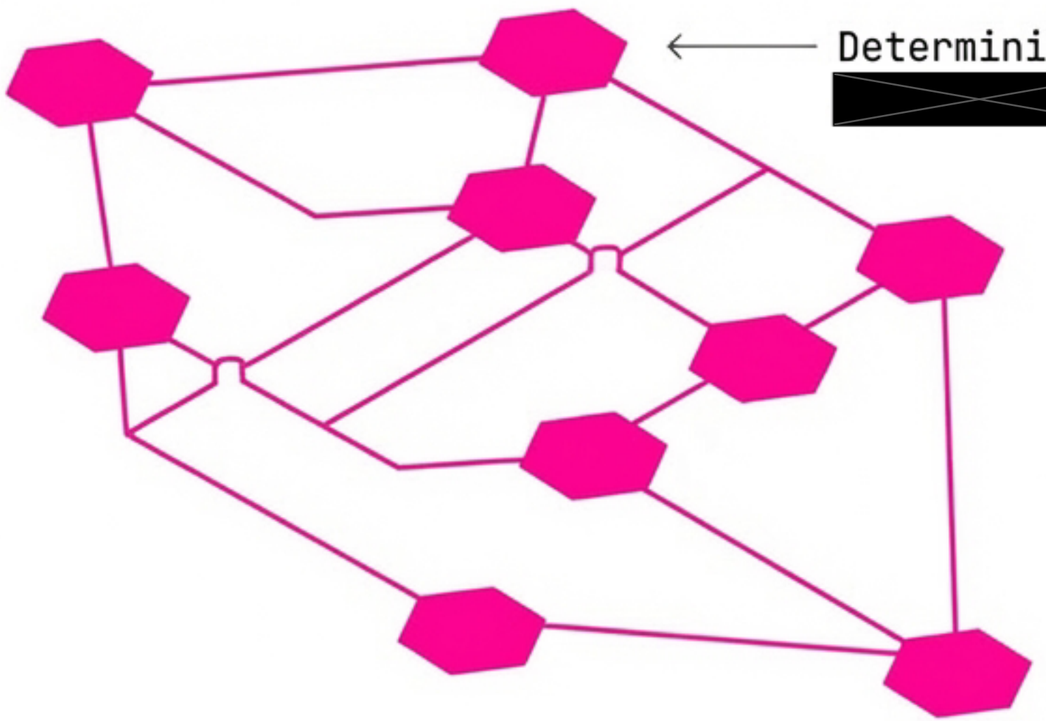
Target: Legal / Compliance / Risk



Data is sealed within its original semantic context. This protects professionals from retroactive judgment by proving exactly what was known and intended at the time of capture. It transforms data from a risk asset into a defensive asset.

The Magenta Beam: Hallucination Defence

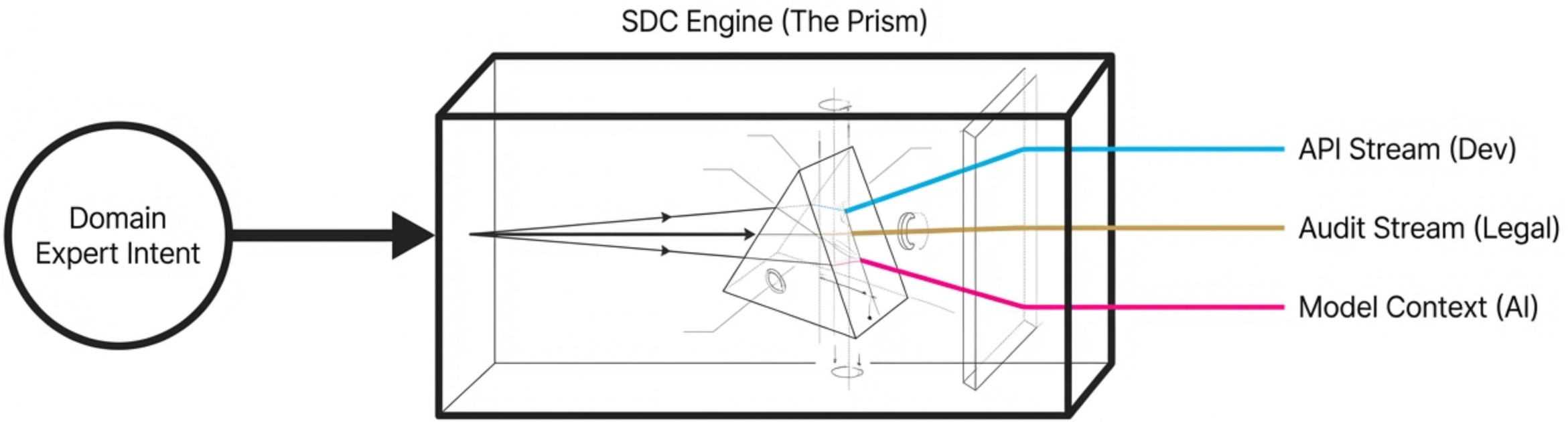
Target: CDO / AI Architects



Instead of probabilistic guessing, we feed the model self-describing data. The AI doesn't have to infer the relationship between data points because the relationship is hard-coded into the semantic capture.

Architectural Synthesis

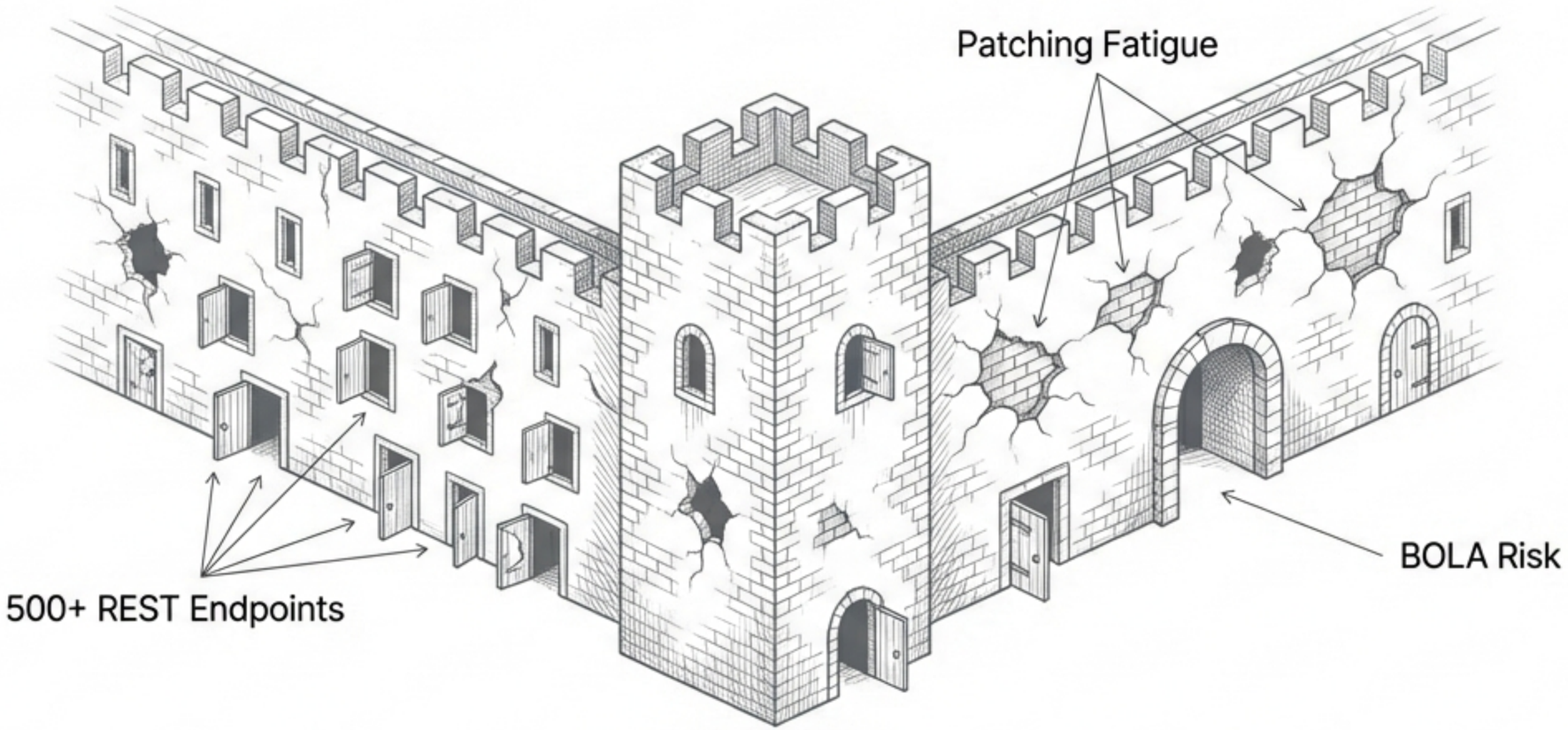
Target: Holistic Enterprise Architecture



Complexity is handled by the refraction, not by the user.

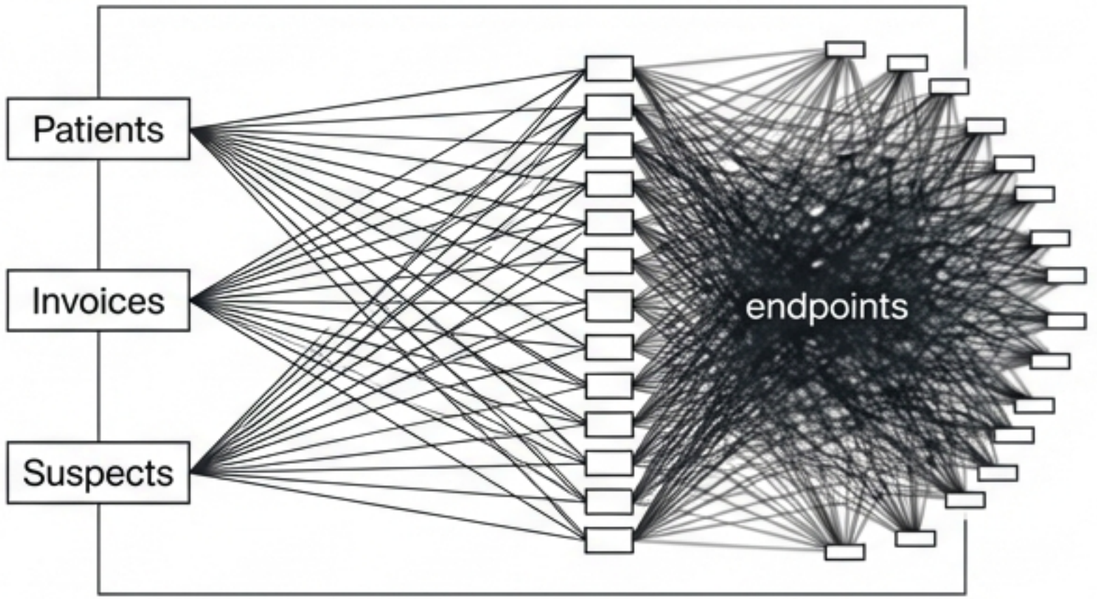
Complexity is the Enemy of Security

In traditional enterprise architecture, an application might have 500+ REST API endpoints. That is 500 doors to lock, monitor, and patch. That is 500 opportunities for Broken Object Level Authorization (BOLA).

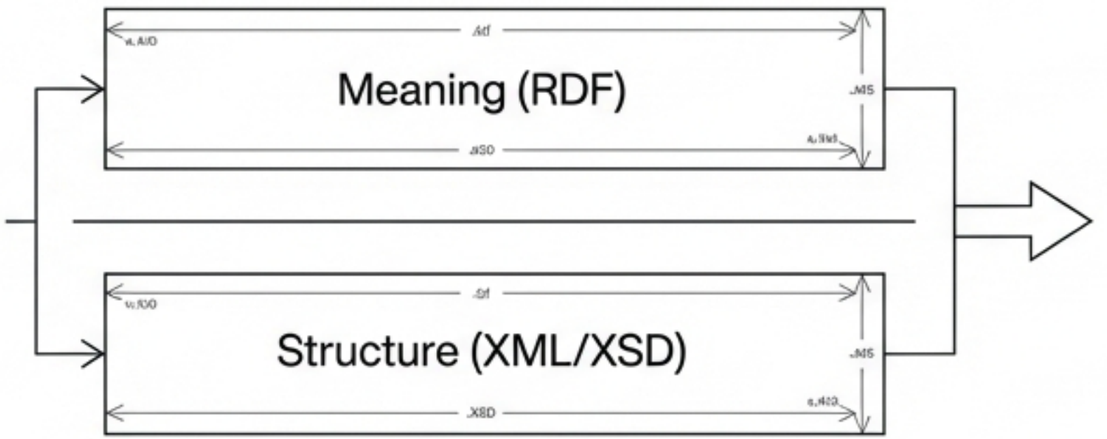


Security via Simplicity

Sprawl Architecture

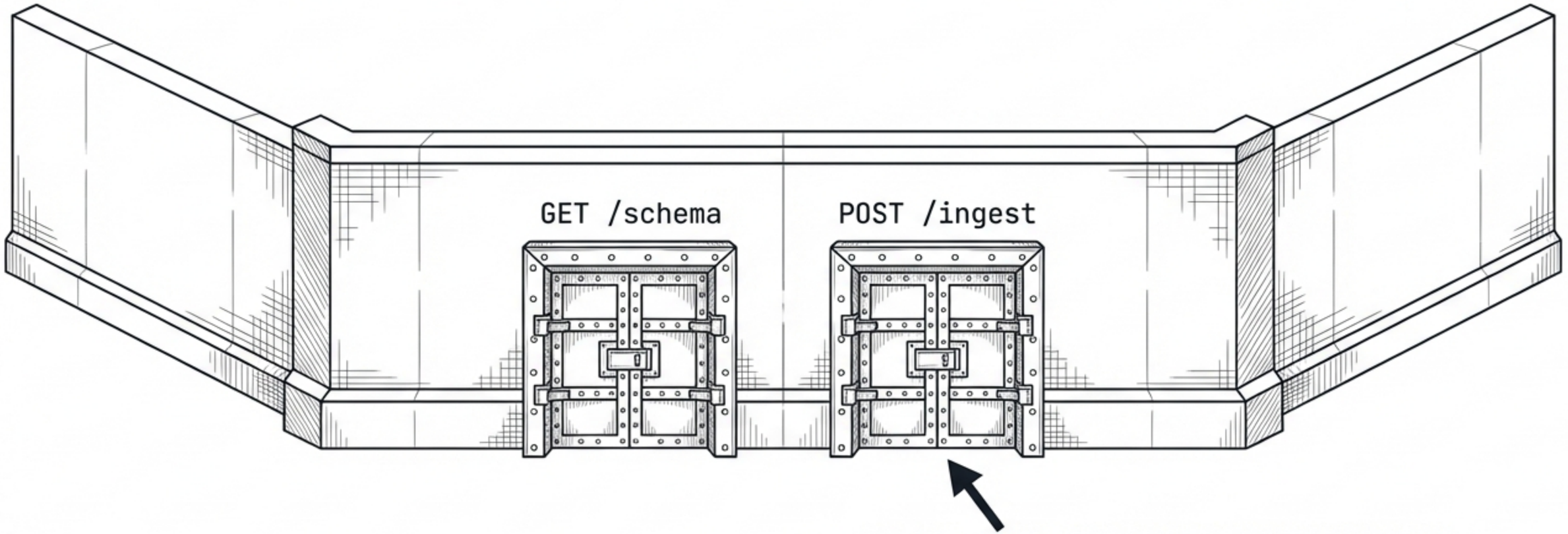


Separated Architecture



The 'Cheat': We separate the Structure (XML/XSD) from the Meaning (RDF). We do not need unique endpoints for every data type. The structure handles the validation, while the meaning handles the context.

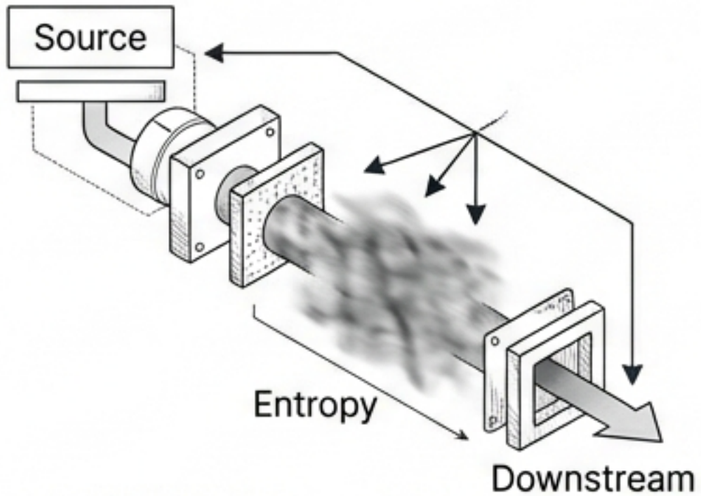
Collapsing the Attack Surface to Two Gates



Strict validation is enforced at the ingest gate. Malformed data is rejected before it ever touches application logic. We don’t have an attack surface; we have an attack point.

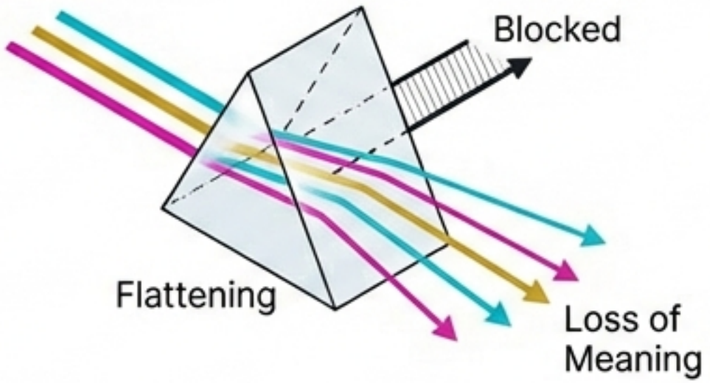
The Physics of the Source

Quality



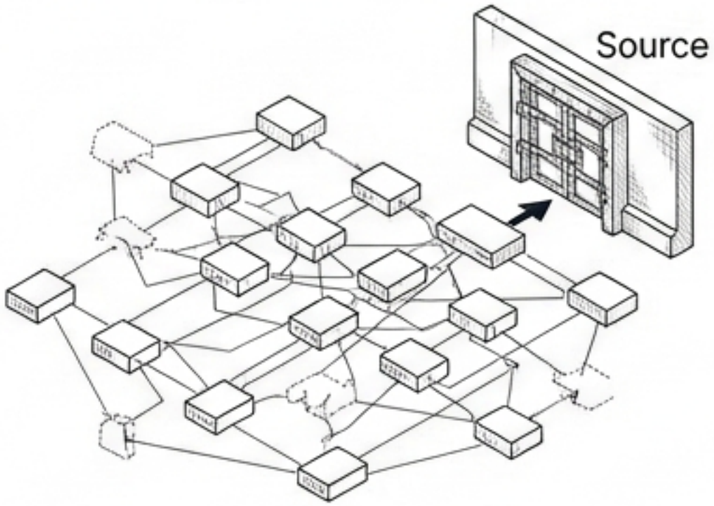
You cannot fix Entropy downstream.

Value



You cannot Refract meaning after it is flattened.

Security



You cannot Secure a sprawling API after it is built.

You have to capture the intent when it happens.
You must solve these problems at the Source.