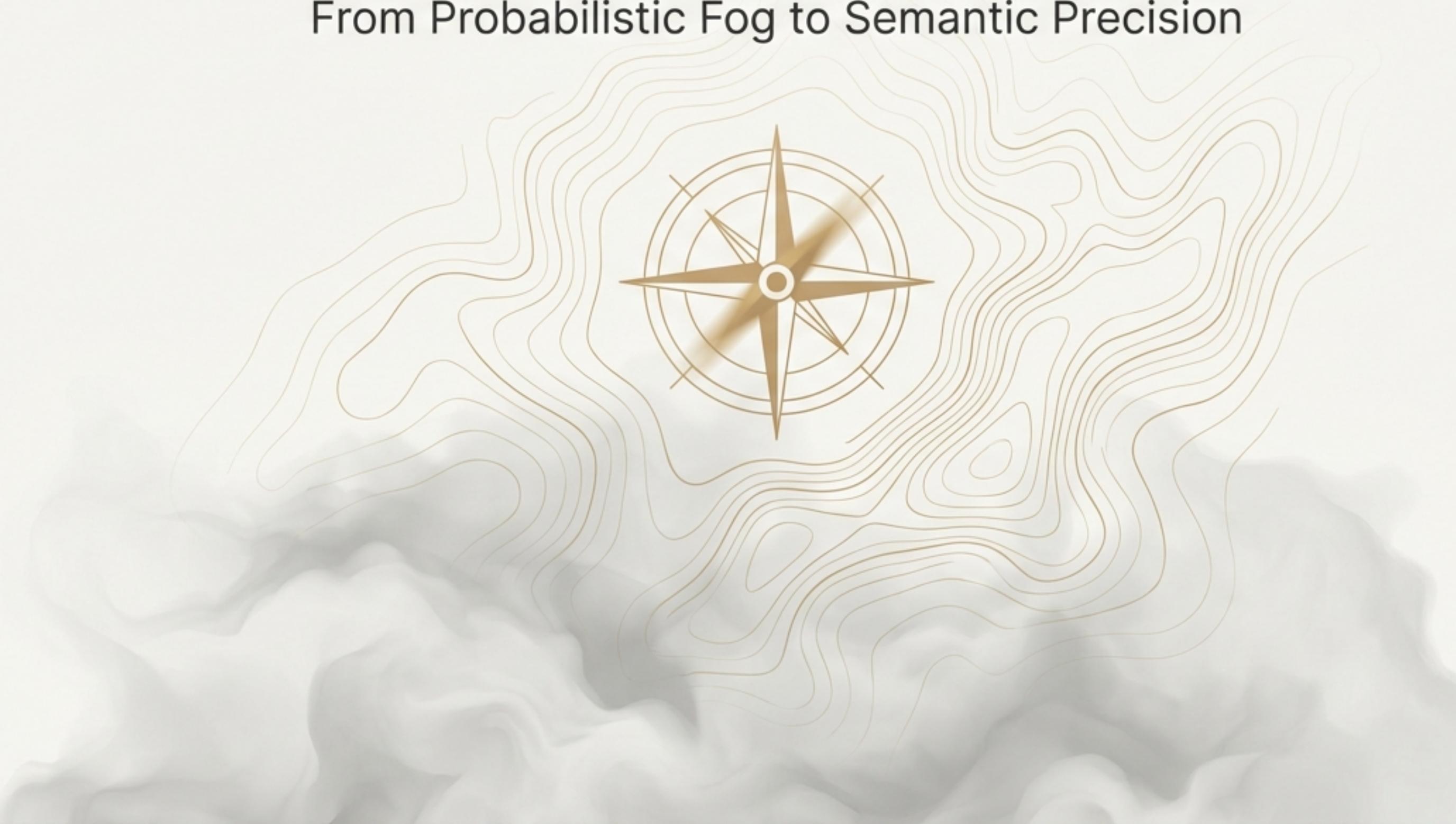


# AI Has a Map Problem

From Probabilistic Fog to Semantic Precision

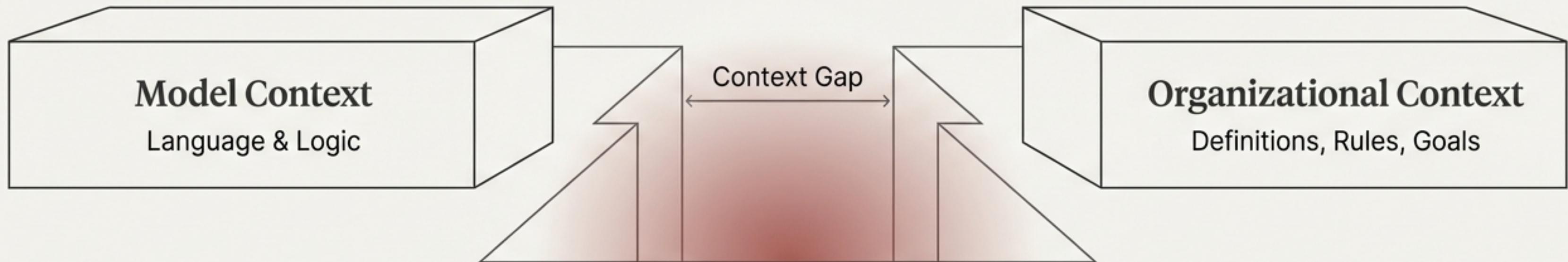


# We are lost in a semantic wilderness.

# 95%

of AI pilots fail in production.

(Source: MIT Sloan via Shubham Bhargav)



This failure creates the **AI Value Chasm**. Powerful models promise to answer our most critical business questions, but they consistently fall short.

The problem isn't the model; it's the **Context Gap**: the vast space between what AI systems know and the unwritten rules, definitions, and judgment calls that live inside our teams.

Without this context, AI operates in a "probabilistic fog," where plausible-sounding outputs mask fundamental misunderstandings. (Source: Jessica Talisman)

# To navigate, we first need rails.

The foundation for reliable AI is the **Controlled Vocabulary**. It's not just a list of terms; it is the infrastructure for precision.

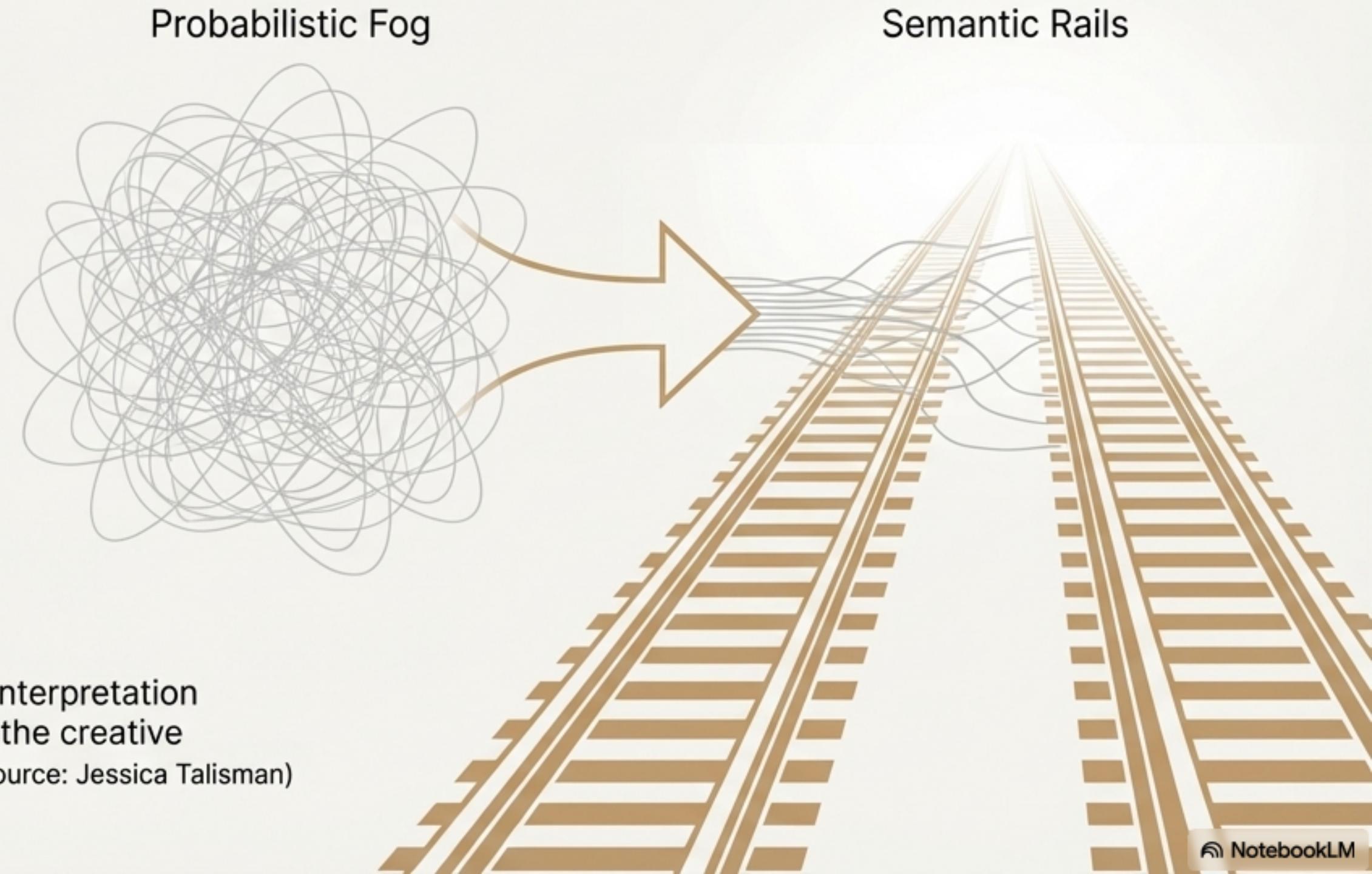
A controlled vocabulary transforms an AI's task:

**FROM:** Guess the most statistically probable meaning.

**TO: Reference the established definition for this context.**

(Source: Jessica Talisman)

They are the '**semantic rails**' that guide an AI's interpretation along established conceptual paths, preventing the creative misinterpretations that lead to hallucinations. (Source: Jessica Talisman)



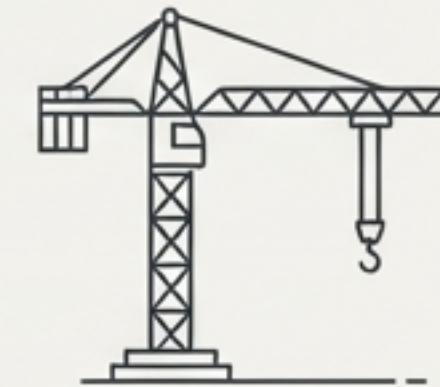
# Disambiguation provides conceptual boundaries.

## Problem Statement

Modern AI excels at finding patterns, but patterns do not make for meaning. A model's response to "cell division" depends entirely on which patterns dominated its training data, not the actual domain context of the query (biology, telecom, or organizational restructuring).

## The Solution in Practice

Disambiguation creates clarity using simple, authoritative definitions. A parenthetical qualifier acts as a contextual gloss specifying the domain.



'Cranes (Construction equipment)'



'Cranes (Birds)'

(Source: ANSI Z39.19 via Jessica Talisman)

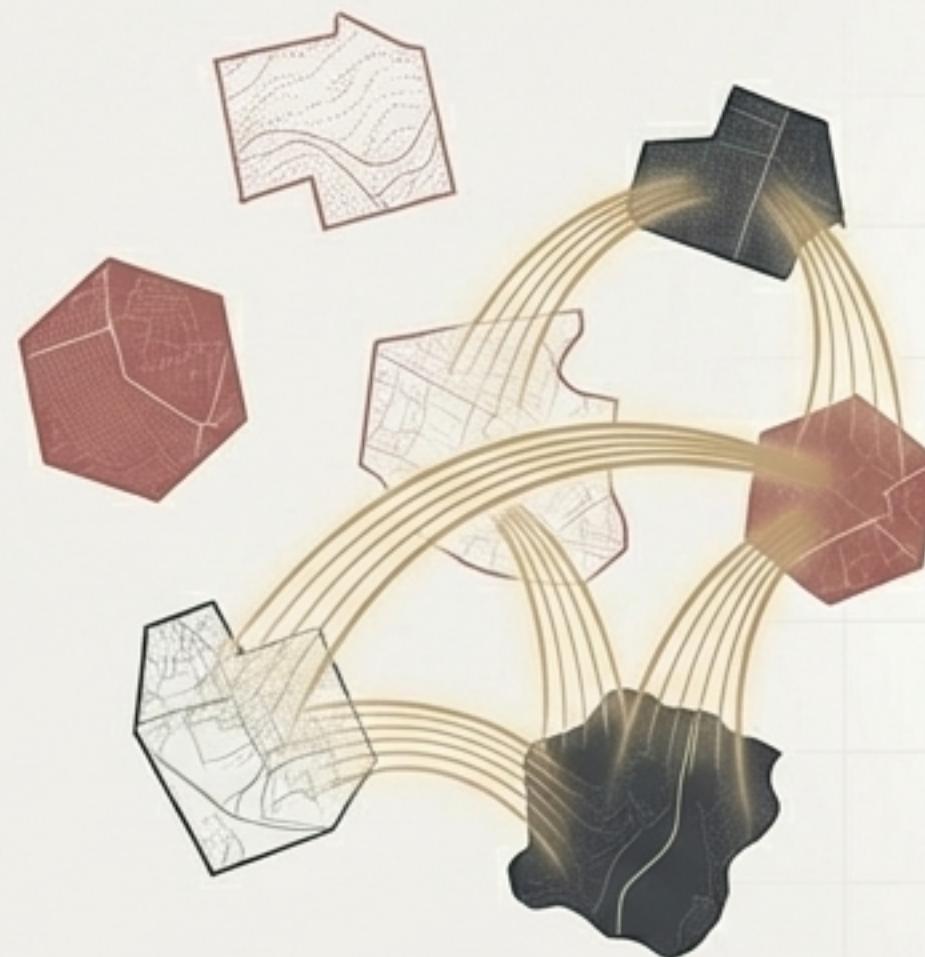
This explicit, encoded context ensures AI appreciates the distinction, moving beyond statistical correlation to semantic understanding.

# With our tools, we can now draw the map.

An **Enterprise Ontology** is the shared map of what matters in your business. It models high-value entities (customers, products, policies) and how they relate, regardless of which app or database they live in.

- It's not a new database; it's a shared model of your business domain.
- It serves as the **playbook** for AI agents. With this map, you can scale agents safely across marketing, sales, and service without re-teaching each one what a "customer" is.
- Every time someone says "Harmonization," "360 View," or "Semantics," they are talking about an ontology.

(Source: Vin Vashishta)



# The Car That Got Sold Twice

## Context is Wrong

A father and daughter research a car. One of them buys it.

Marketing systems see two independent events and promptly try to sell the same car to both of them again.

Millions are wasted in marketing spend.

(Source: Vin Vashishta)



Campaigns suppress duplicates. Analytics count the win once. Customer trust rises.

## A Shared Map of the Journey

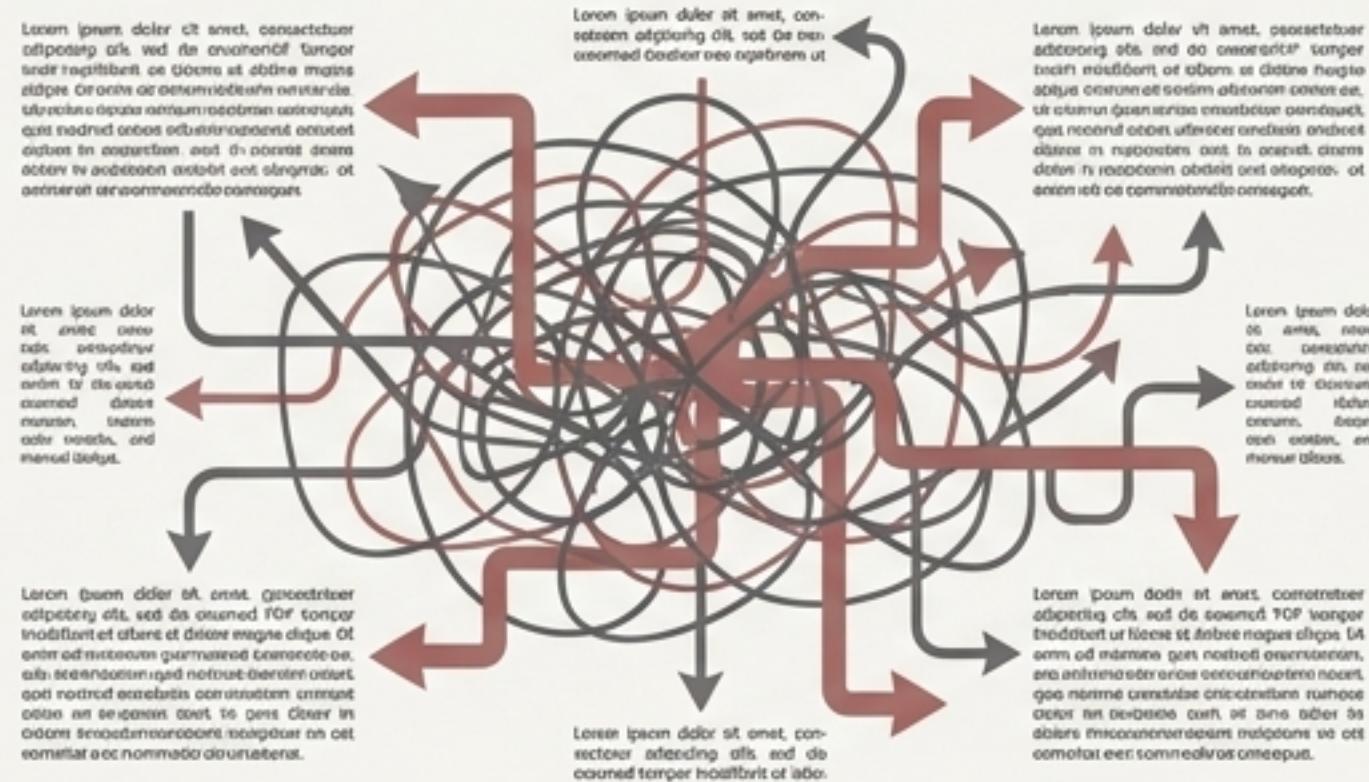
The ontology understands the relationships, creating a single, coherent view.

# Clinical Trial Eligibility in Seconds, Not Hours

## Tribal Knowledge & Unstructured Data

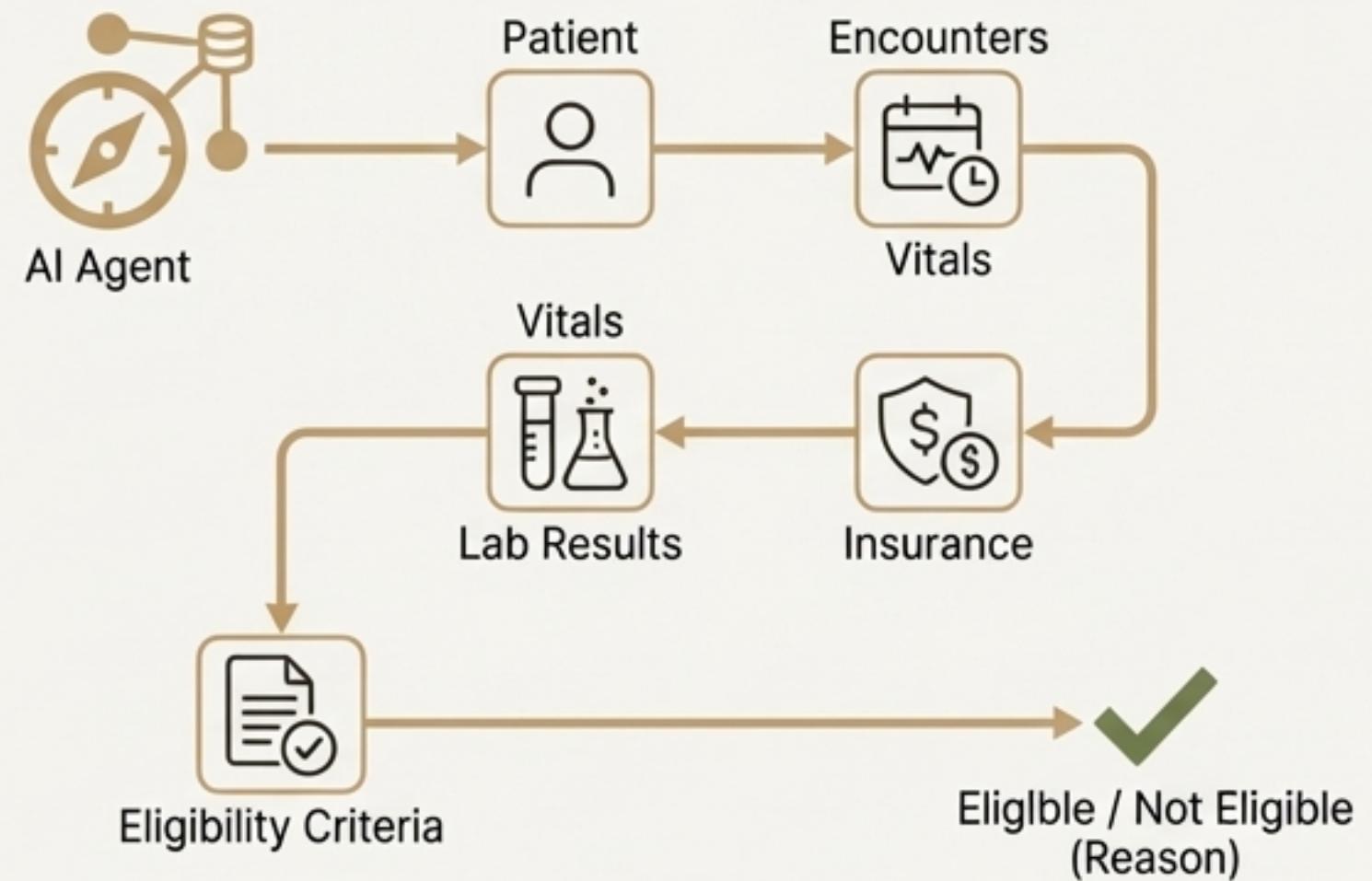
A patient asks, "Am I eligible for this trial?" The answer is buried in an 80-page PDF decision tree nightmare. The process requires escalations, callbacks, and manual data lookups. (Source: Vin Vashishta)

### The Manual, Broken Process



## The Ontology-Driven Solution

An AI agent navigates the ontology instantly, connecting the patient's structured data to the trial's criteria.



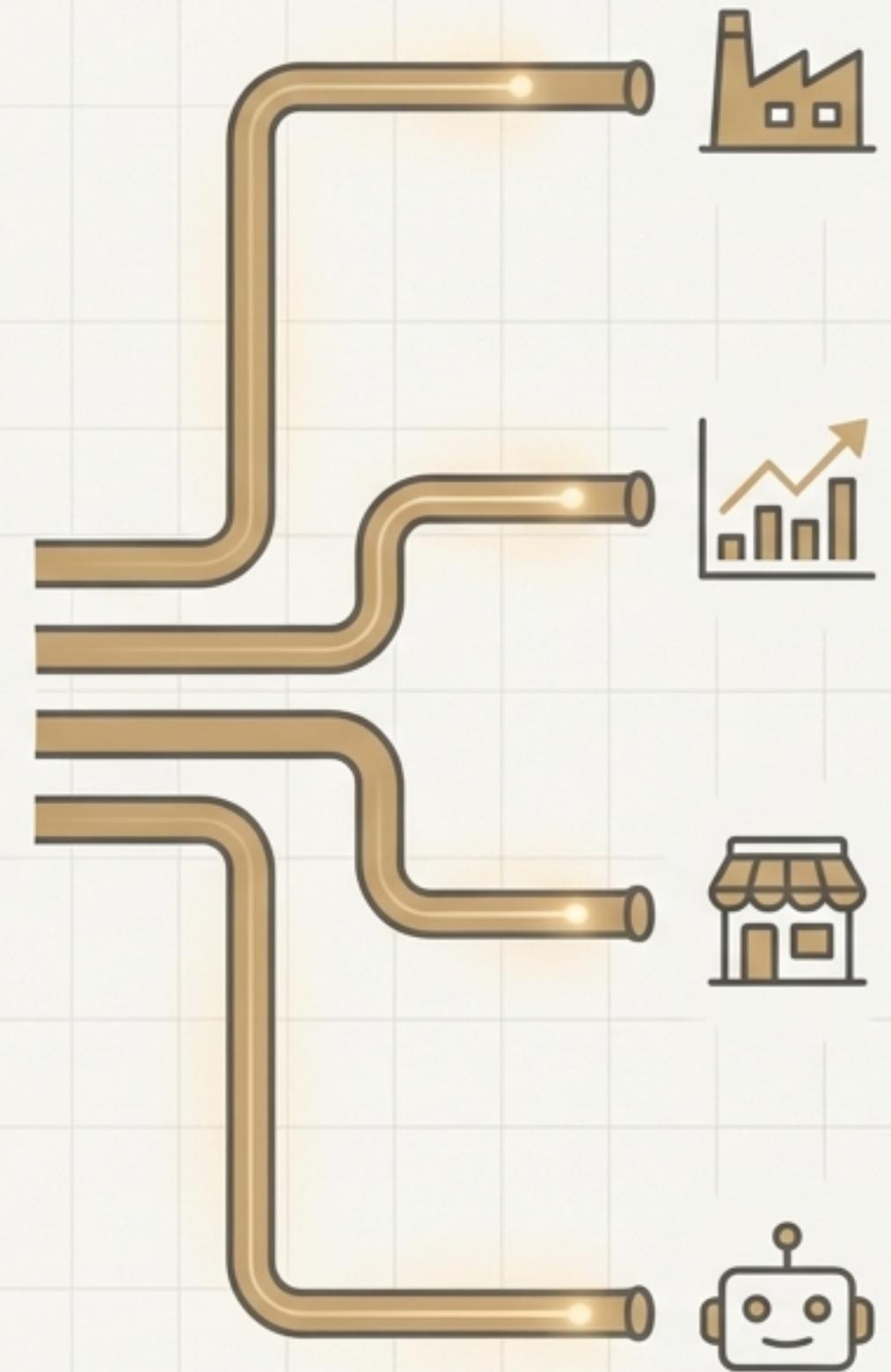
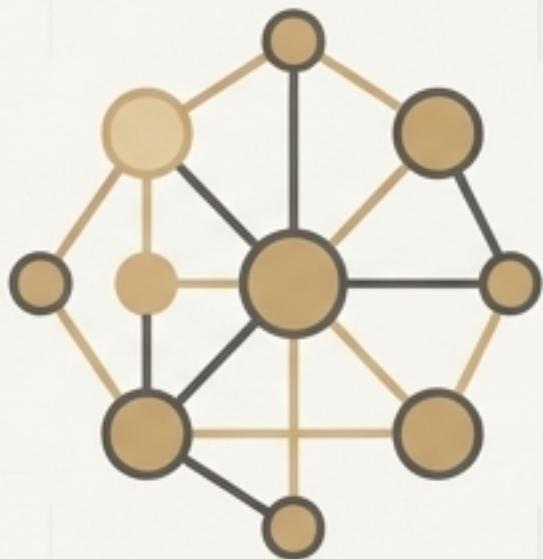
The agent walks the tree instantly and gives a confident yes/no with reasons, in real-time.

# A map is useless without roads.

We must build a **Knowledge Infrastructure** to ensure meaning flows reliably across the enterprise. This is not a project; it is the construction of an “institutional brain.”  
(Source: Jessica Talisman)

**Knowledge Infrastructure:** The blend of tools, processes, and systems that allows for the capture, transfer, and reuse of knowledge.

**Context Supply Chain:** Just as data pipelines ensure data quality, a context supply chain ensures **semantic quality**—the consistency and correctness of meaning across all systems.  
(Source: Shubham Bhargav)



# The 5 Steps of Context Engineering

The mandate for data teams is to engineer context into models. This is not a one-time setup, but a living loop of continuous refinement. (Source: Shubham Bhargav)

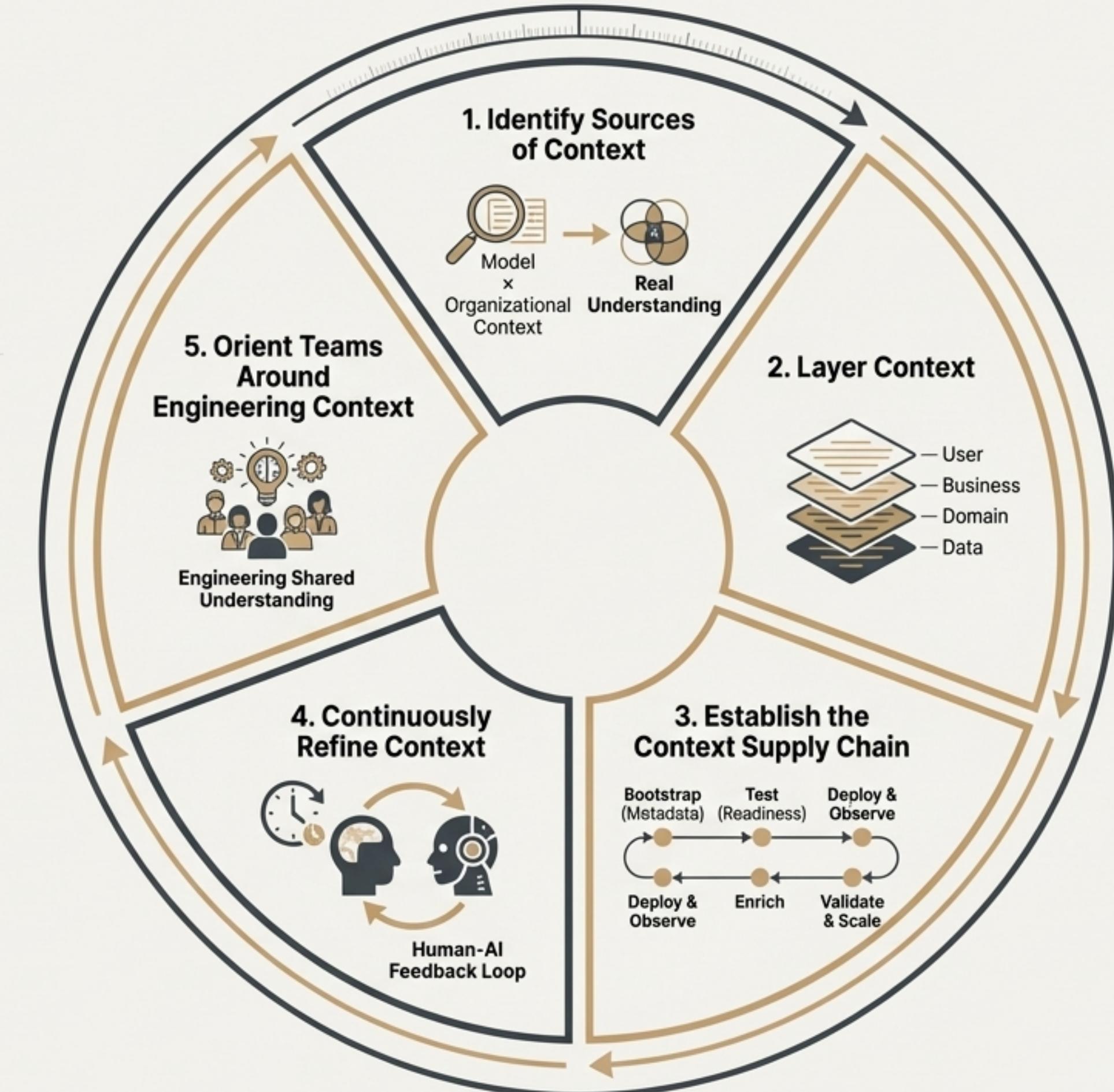
**Identify Sources of Context:** Separate general *model* context from specialized *organizational context*. The goal is 'Model Context  $\times$  Organizational Context = Real Understanding'.

**Layer Context:** Create a 'semantic scaffold' by layering context about users, the business, domains, and the data itself.

**Establish the Context Supply Chain:** Bootstrap from existing metadata, test for readiness, continuously deploy & observe, enrich, then validate & scale.

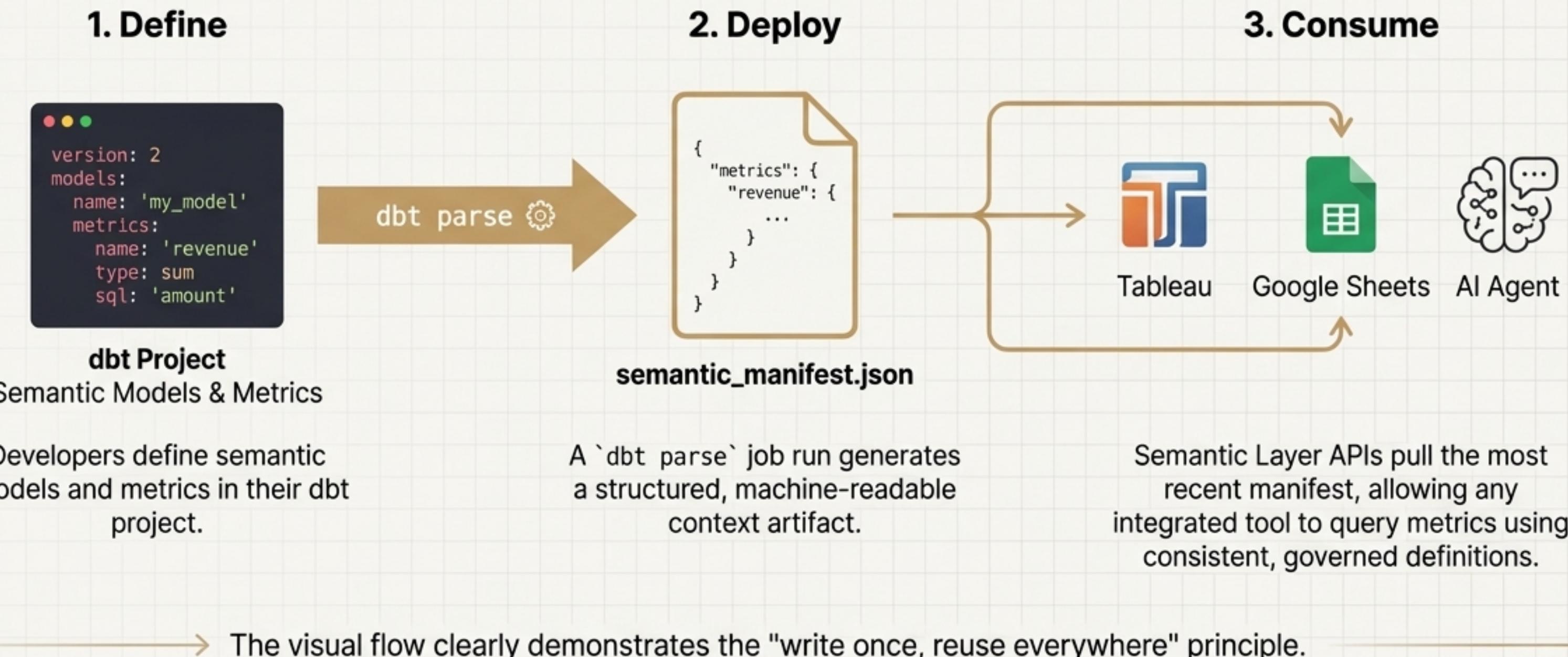
**Continuously Refine Context:** Treat context like data—it decays. Use a human-AI feedback loop for continuous enrichment, making knowledge a living system.

**Orient Teams Around Engineering Context:** Shift the focus from producing data assets to **engineering shared understanding**.



# Infrastructure in Practice: Deploying Metrics as Context

A real-world example of a context supply chain component is the dbt Semantic Layer.



# The destination is clear, but so is the horizon.

## The Limit of AI

No matter how much structured context you provide, something essential remains out of reach. Machines can detect signals, but humans interpret stories.

## Introducing the 'Semantic Gap'

This gap is defined by **Semantic Density**: the hidden layer of meaning beneath our words. It's the unspoken stakes, cultural shorthand, intuition, and lived experience that humans bring to every interaction. (Source: Vince Dacanay)

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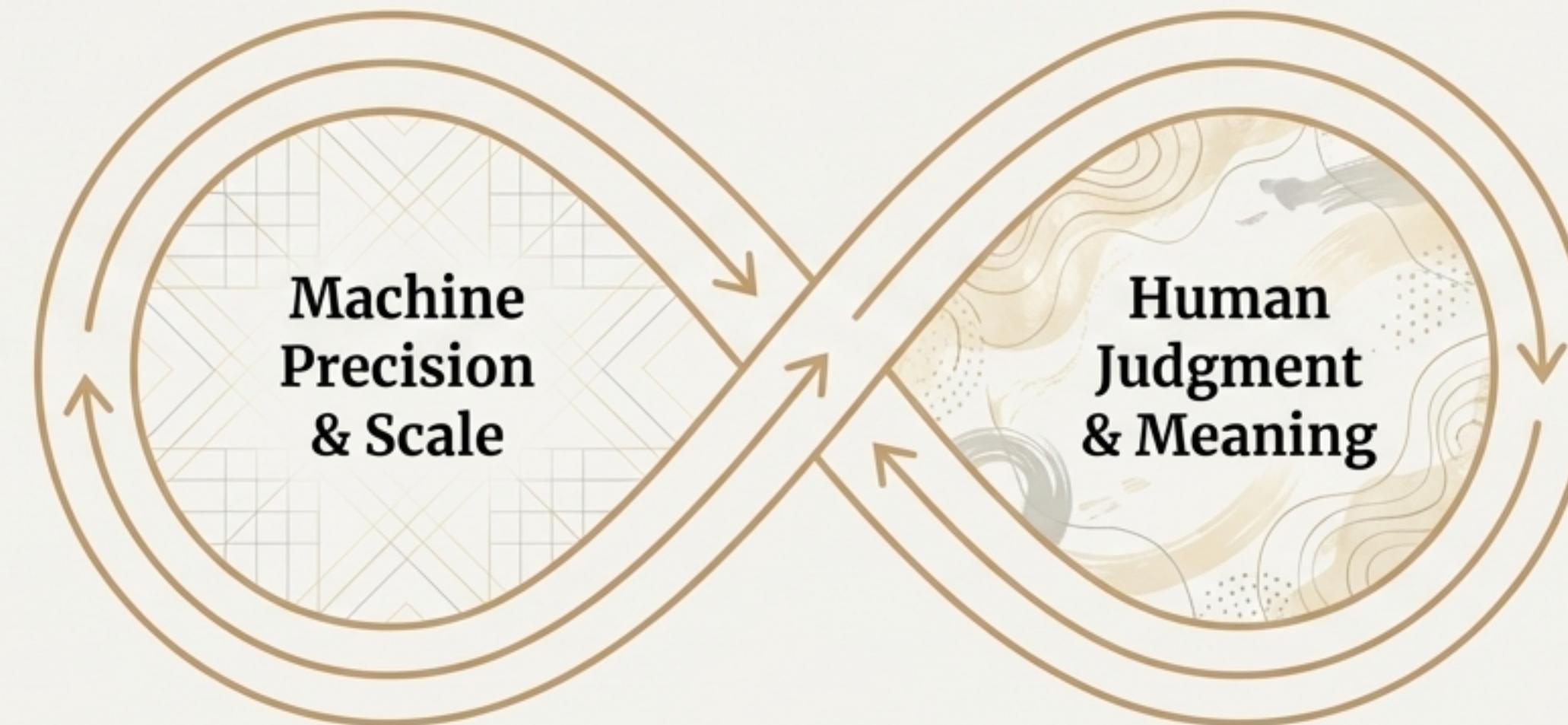
An AI can see patterns in customer churn data. A human understands the story behind the cancellation—the frustration of feeling ignored, the distrust built over months.



# Augmented Intelligence is the True Advantage

## The Ultimate Payoff

**AI accelerates reasoning:**  
It analyzes structured information at a massive scale, surfacing patterns humans would miss.



## The New Human Role

This journey transforms the data professional.

**FROM**

A translator of data  
(fluent in SQL and business).



**TO**

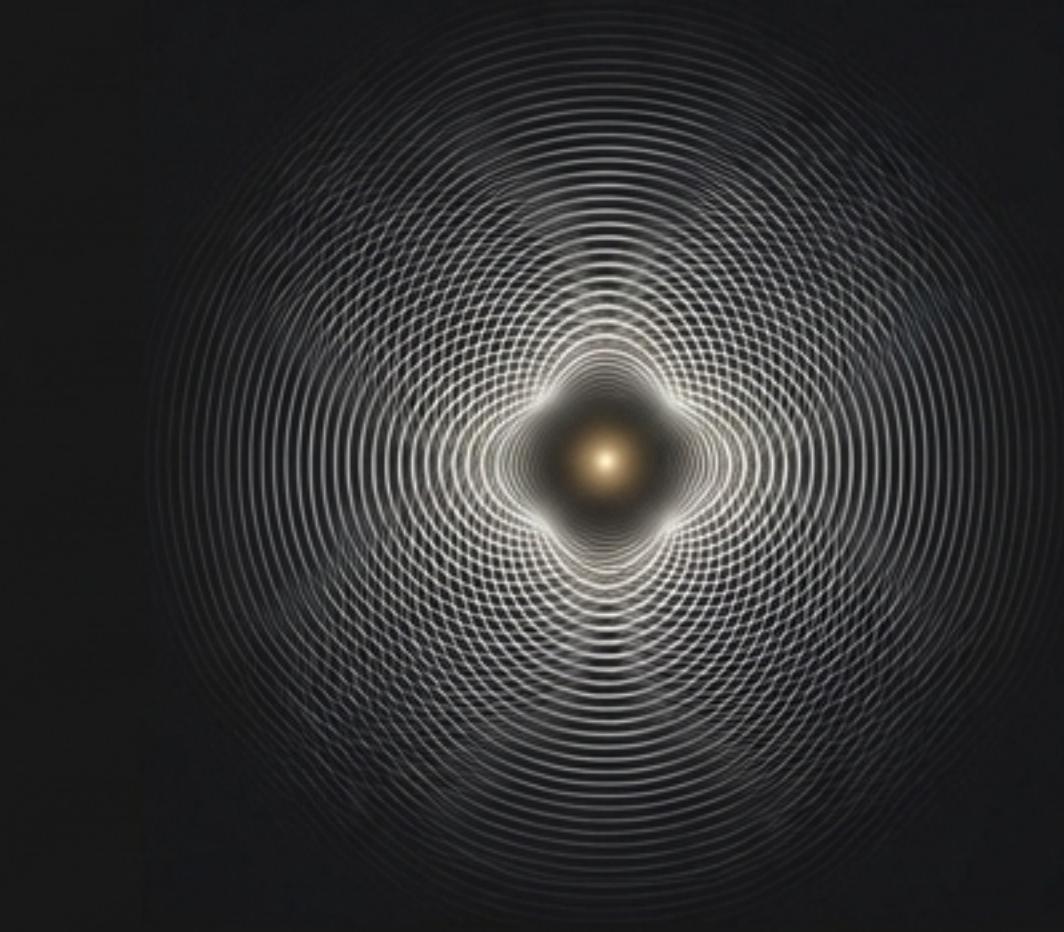
An engineer of meaning  
and the keeper of semantic density.

**"AI accelerates reasoning; humans refine meaning. And with that, the promise of AI can finally become reality."** (Source: Shubham Bhargav)

**Humans refine meaning:**  
They handle the gray areas, ambiguous decisions, and political nuance where semantic density matters most.

# The Frontier: A Physics of Information?

We have mastered building roads on this continent. But pioneers are now charting entirely new ways to travel.



A model-free framework uses **surprisal** (information theoretic uncertainty) to reason directly from raw data.

Instead of building explicit models, this approach measures how surprising it would be to substitute one data point for another, allowing for inference across generation, causal discovery, and anomaly detection.

**The Promise:** A potential alternative path to AI that is inherently traceable, interpretable, and maintains human understandability of the underlying mechanics.