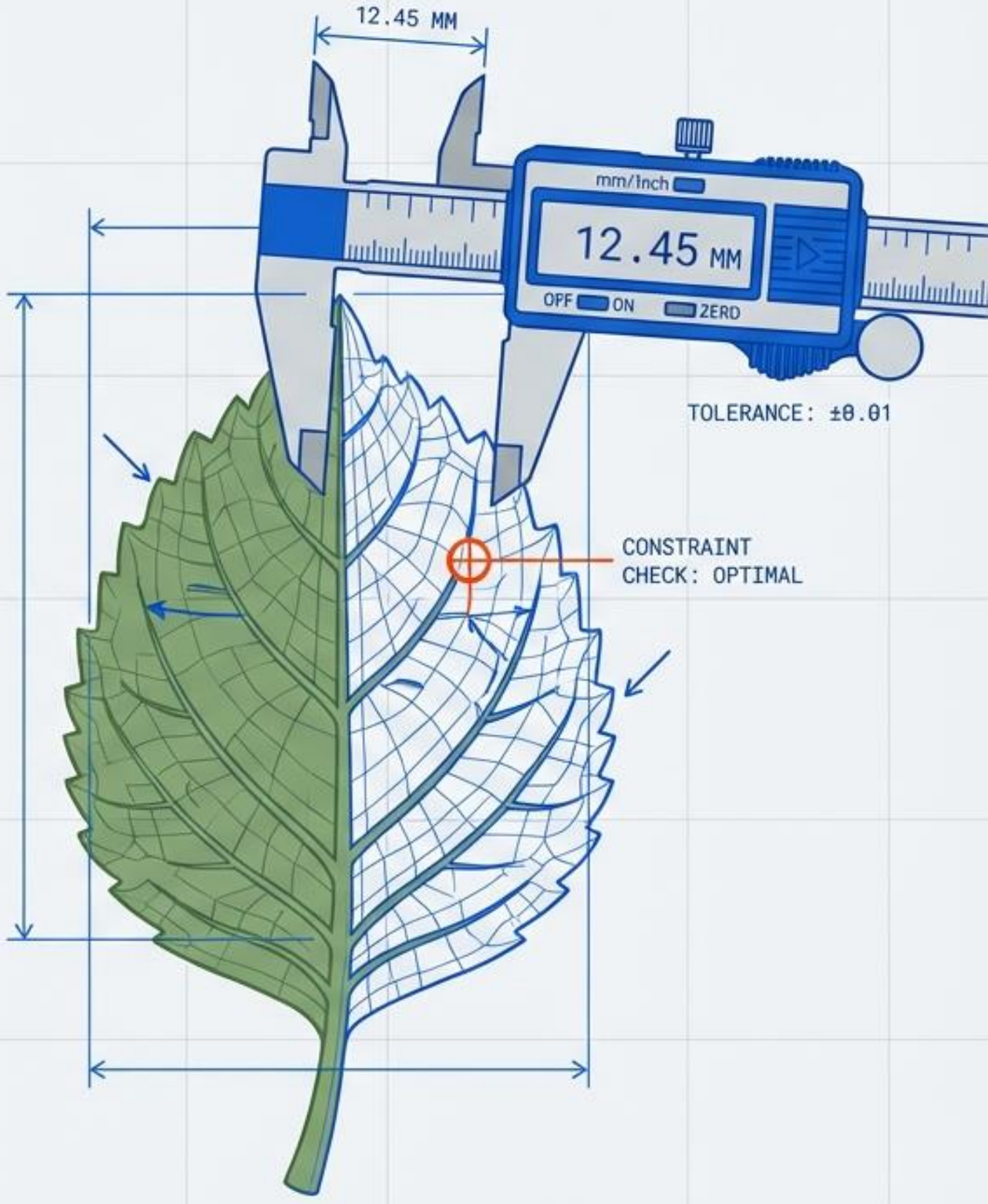
LESSONS LEARNED FROM ACLCA WORKSHOP ON AI IN LCA

Evaluating AI-Powered LCA



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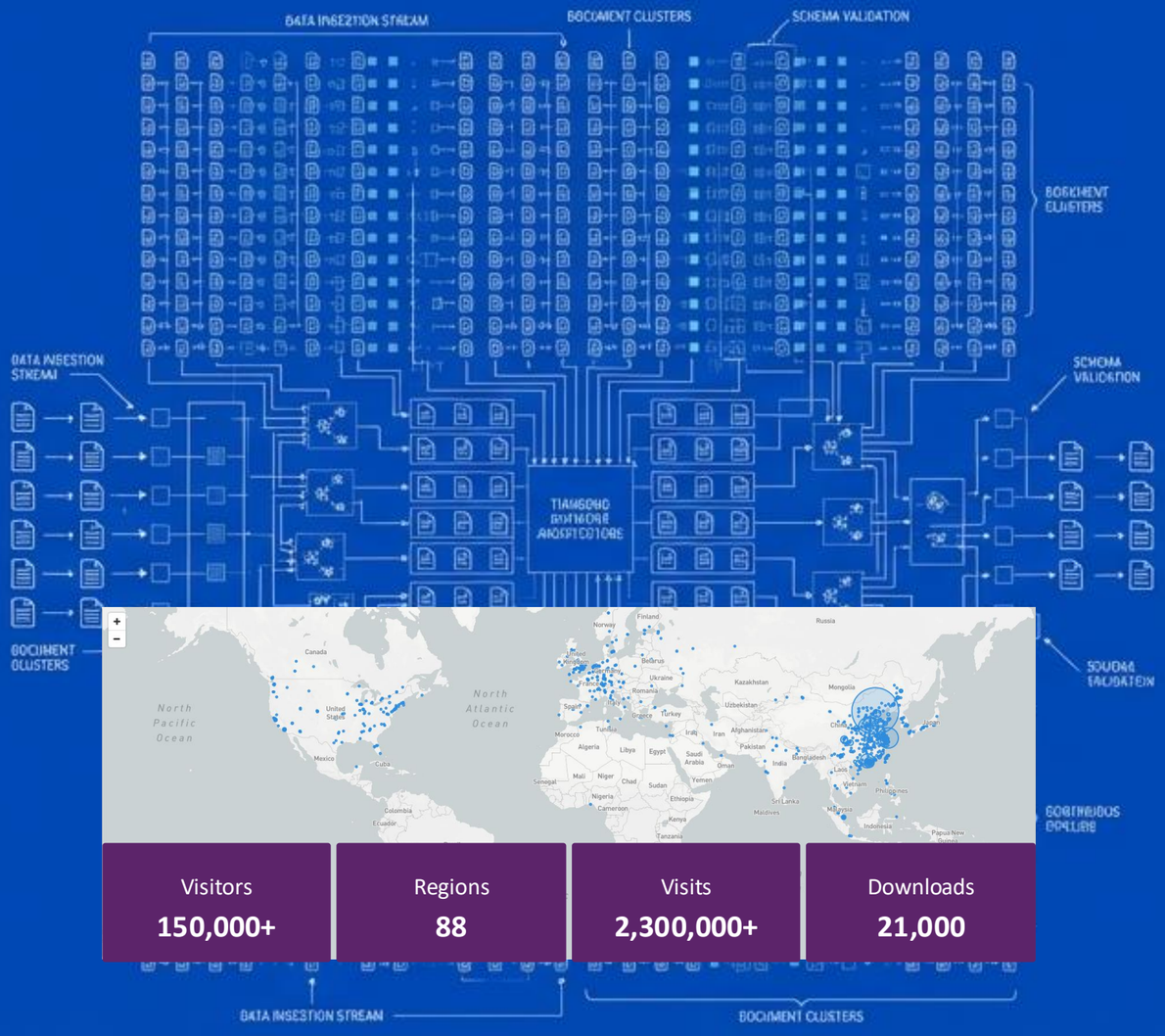
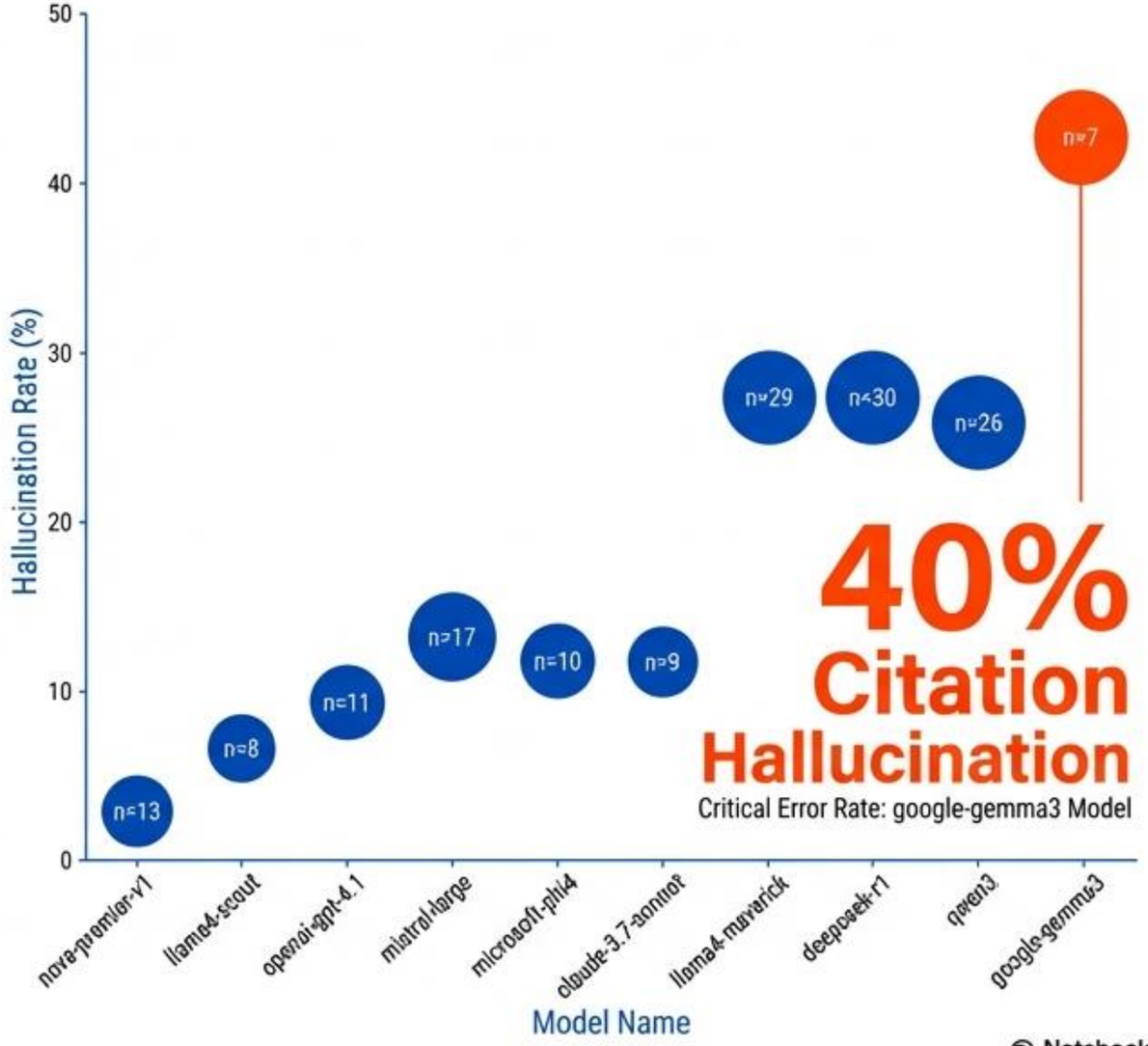
The Elephant in the Room: Scale Without Validation is Fragile

MASSIVE SCALE: TianGong Initiative & Continuous Data Ingestion



https://lca.tiangong.earth/

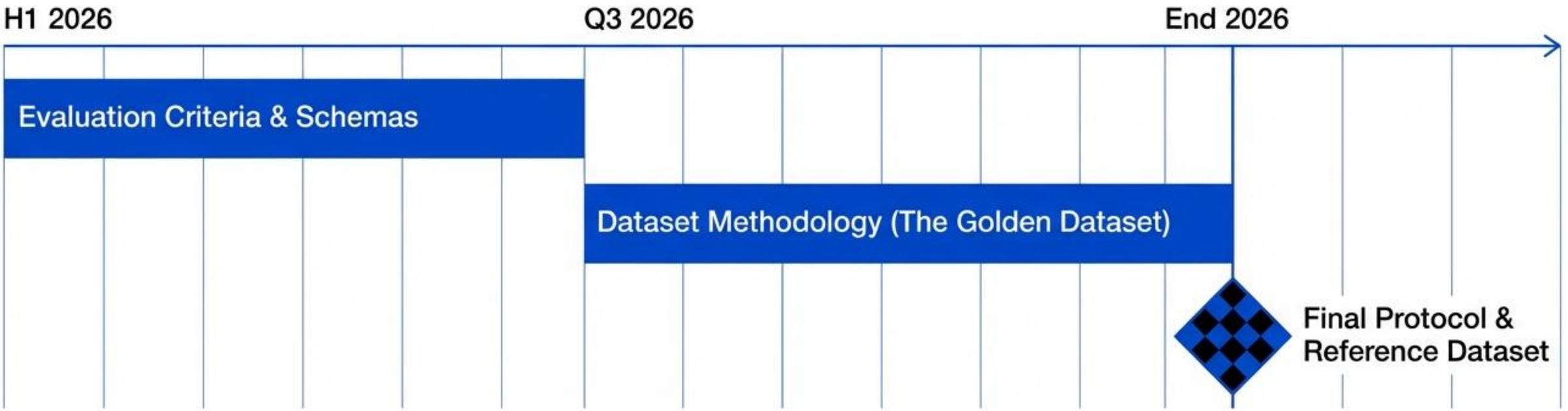
HALLUCINATION BENCHMARK: Fragility Revealed



NotebookLM

Swiss Engineering Precision

The ACLCA Working Group Mandate



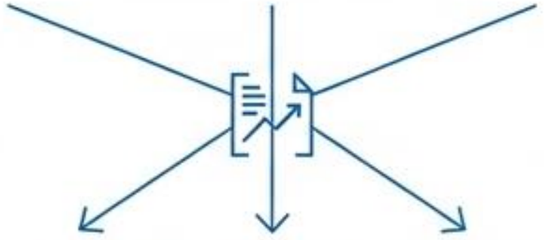
Objective: Establish the method and data for evaluating the quality of AI-powered LCA tools to support annual evaluation.

Challenge 1: The Ground Truth Paradox

Expert Consensus is Rare. AI cannot predict a single number that doesn't exist.

Case Study 1: The Wine Bottle

PRACTITIONERS

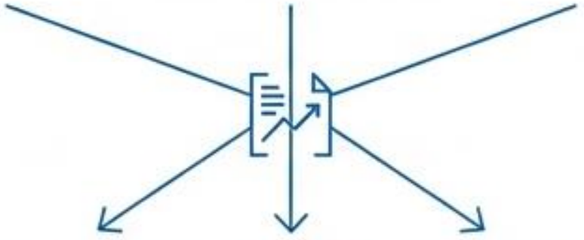


±20% Variation

Divergence in Results

Case Study 2: The Office Building

EXPERT TEAMS

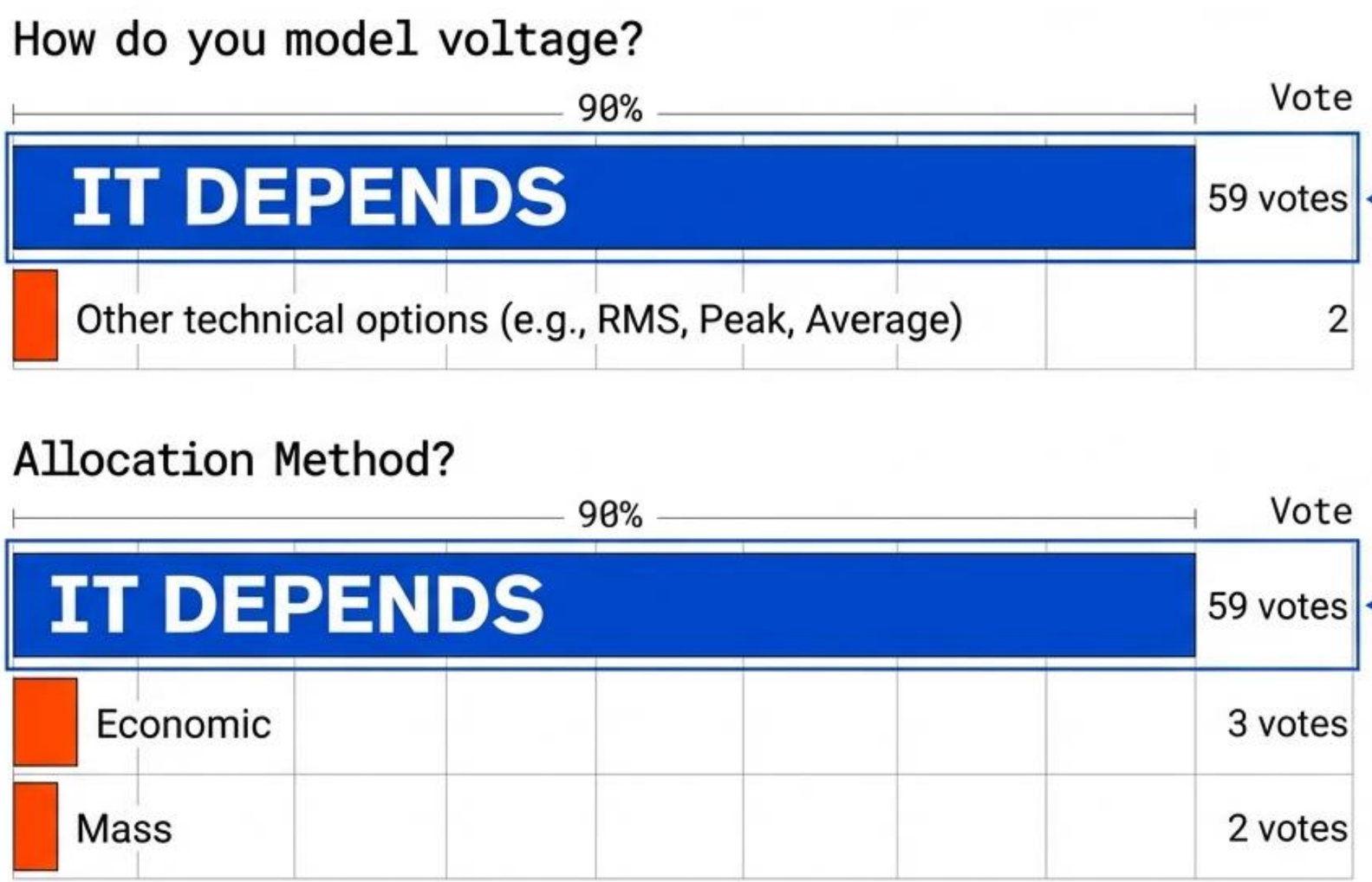


Factor of 7 Variation

10$ vs $71 kg CO_2e

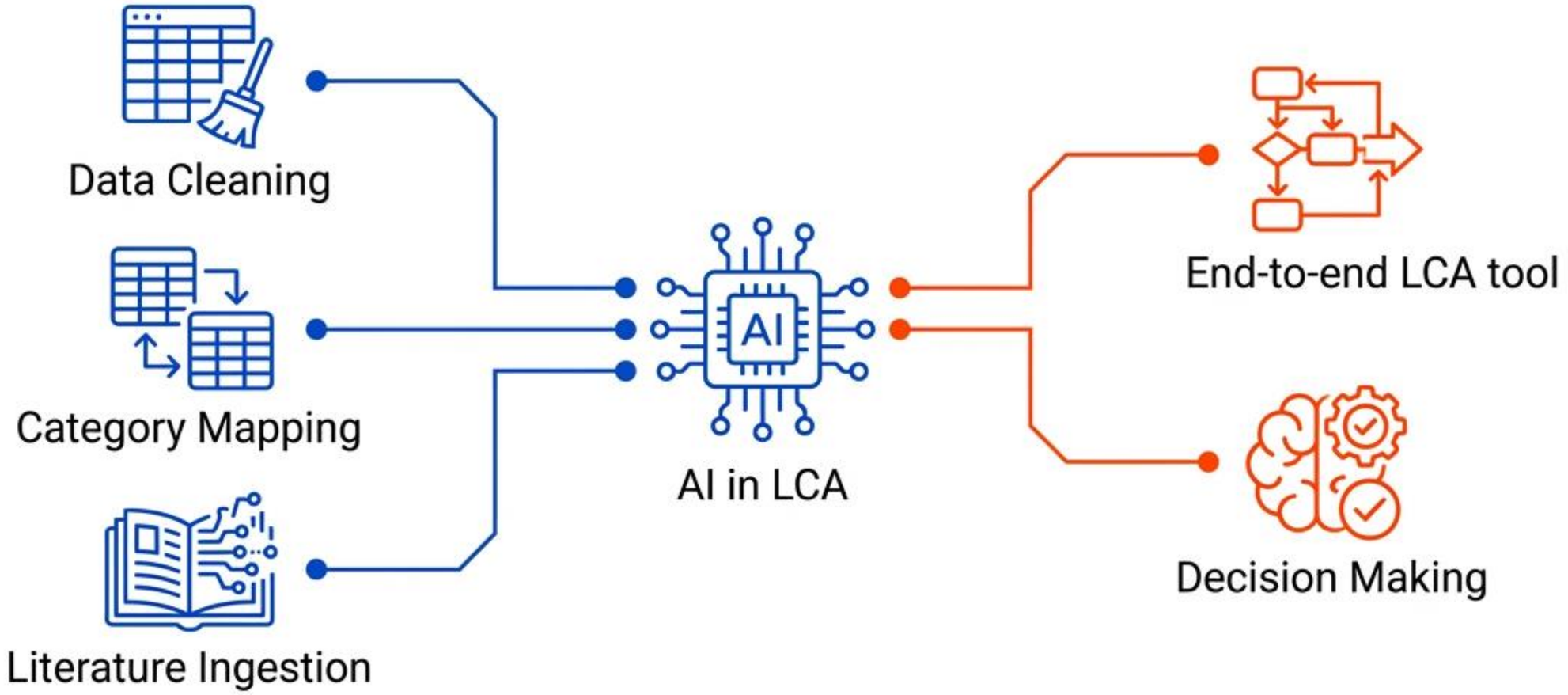
Challenge 2: The “It Depends” Ambiguity

Expert consensus is frequently elusive;
the answer is context-dependent.



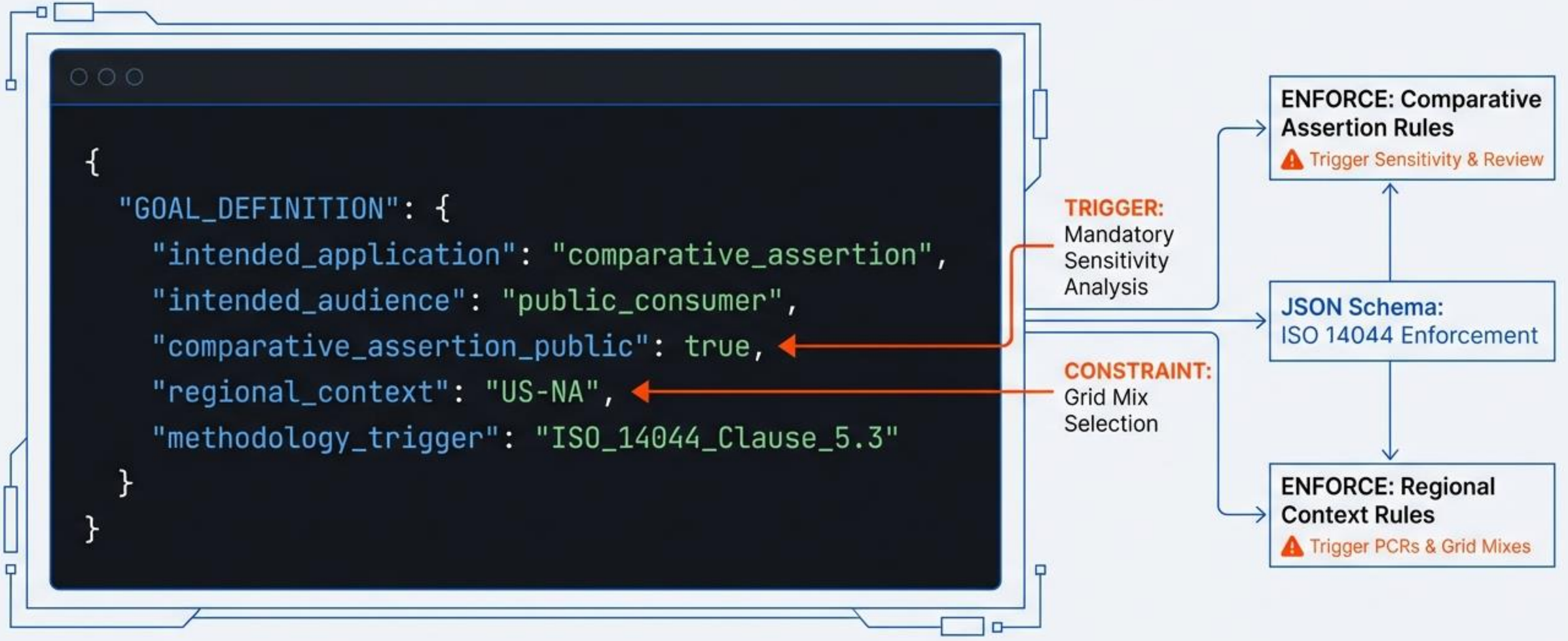
Correctness is a function of Goal & Scope, not just physics.

Defining the Scope: Taxonomy Matters

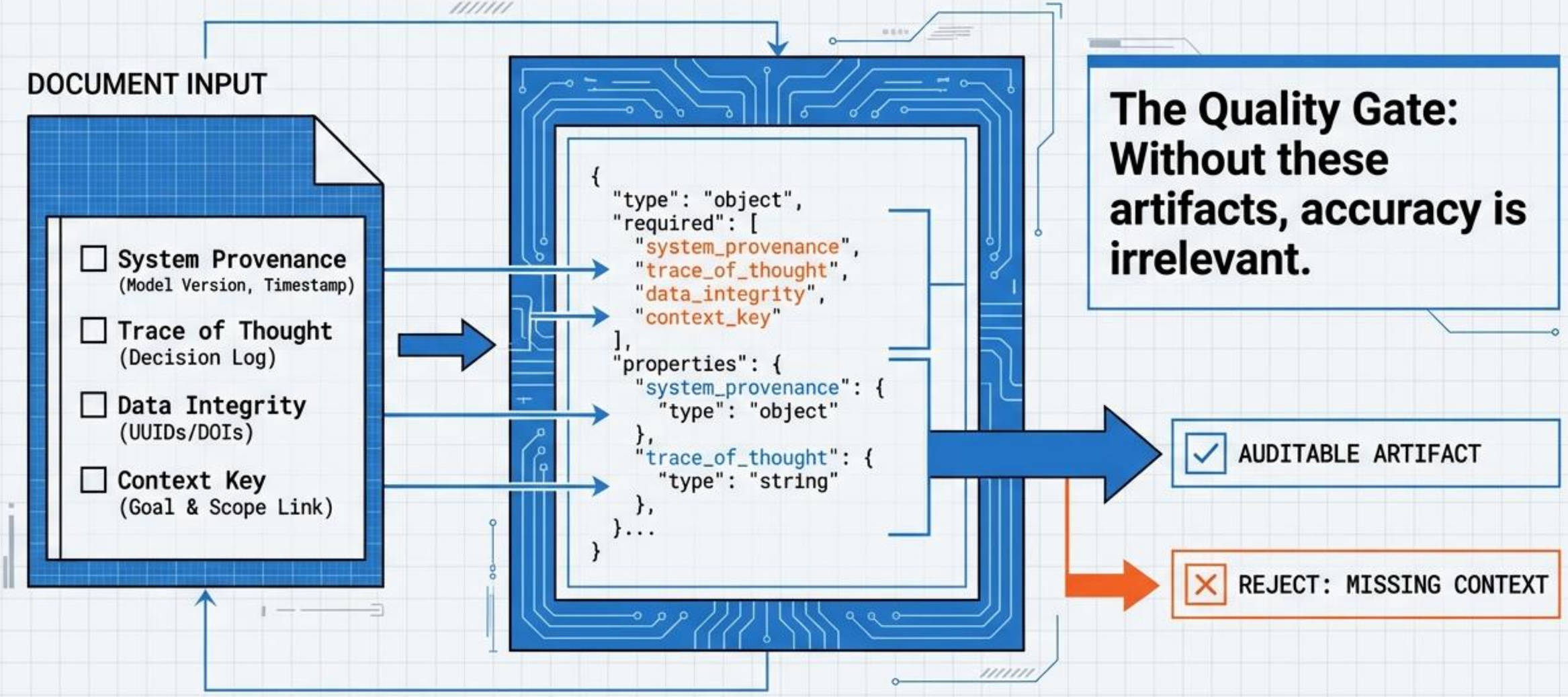


Evaluation Principle: Fitness for Purpose

Pillar 1: Machine-Readable Goal & Scope



Pillar 2: Minimum Documentation Requirements (MDR)



Pillar 3: Property v.s. ground-truth data evals

FORMULA VALIDITY

$$\frac{A * B}{C}$$

CHECKED

Detect flipped multiplication/division signs.

PHYSICAL PLAUSIBILITY

`Output Mass > Input Mass`

FAILED

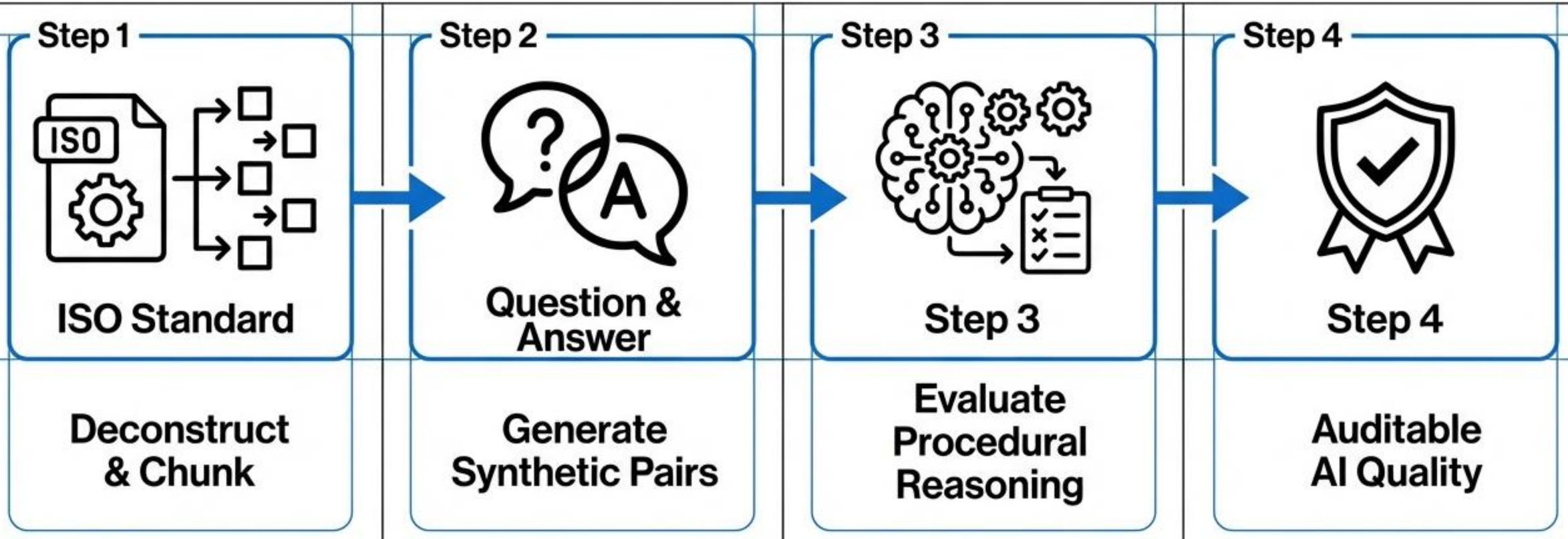
Impossible mass balance. Flag immediately.

FAITHFULNESS

CHECKED

Verify cited sources exist in retrieved context.

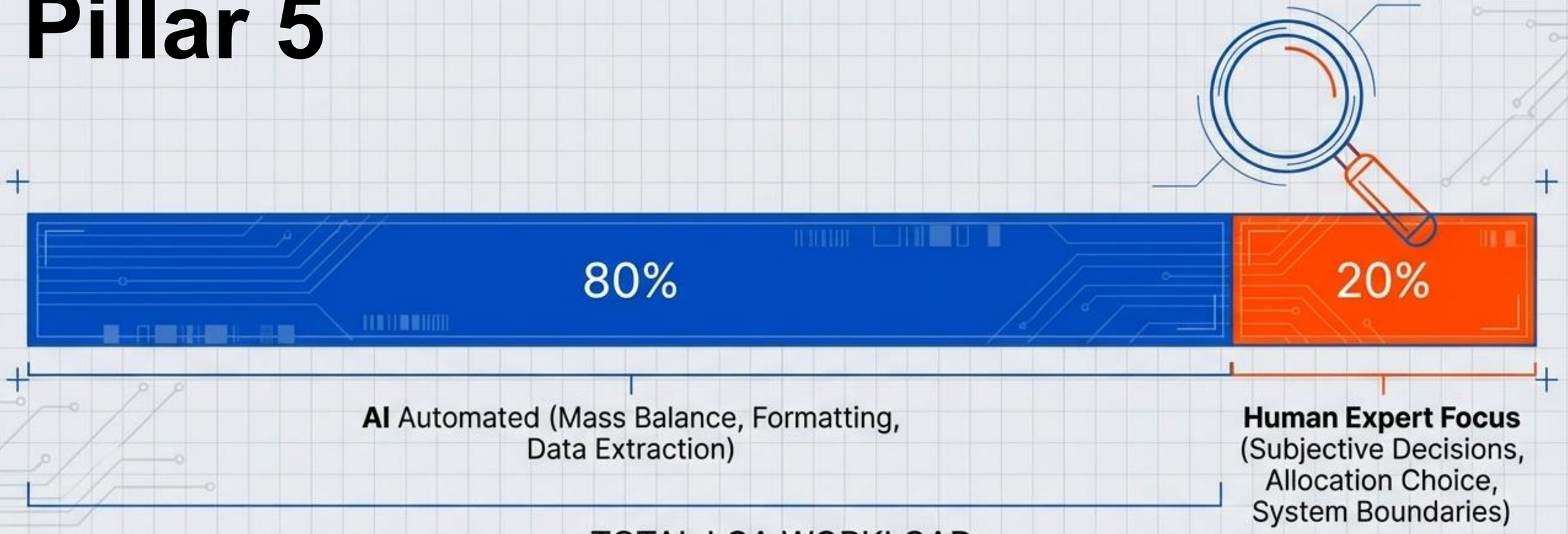
Scaling the Test: Pillar 4 Synthetic Q&A Generation



Recreate the flow from deconstructed standard to validated quality.

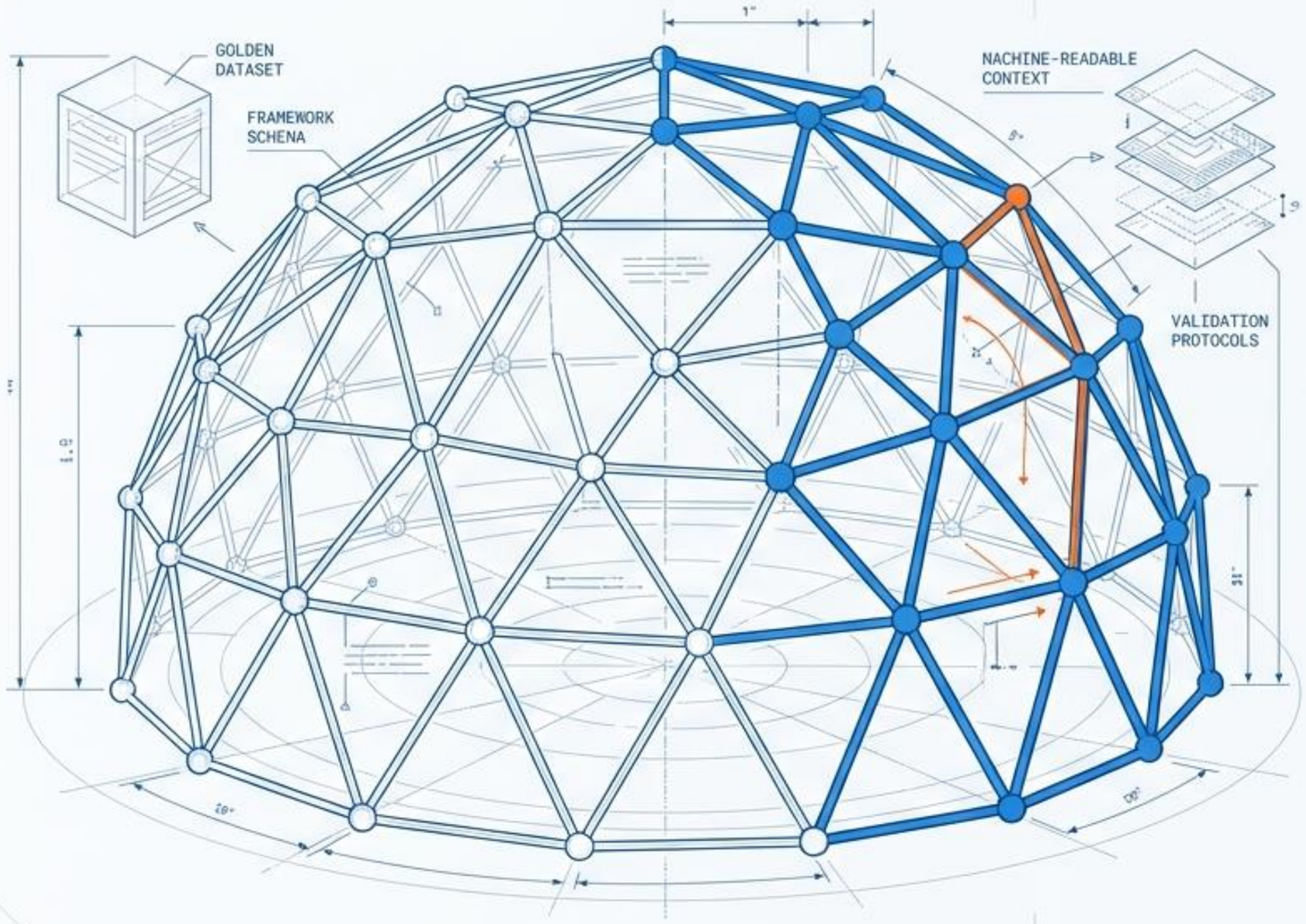
The Governance Layer: Human as Logic Verifier

Pillar 5



Shift focus from data hunting to logic verification.

Building the Foundation



- From “Stochastic Parrots” to Precision Engineering.
- Standardized Context via Machine-Readable Schemas.

→ Help us find ISO-compliant LCA reports and review/audit trails

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