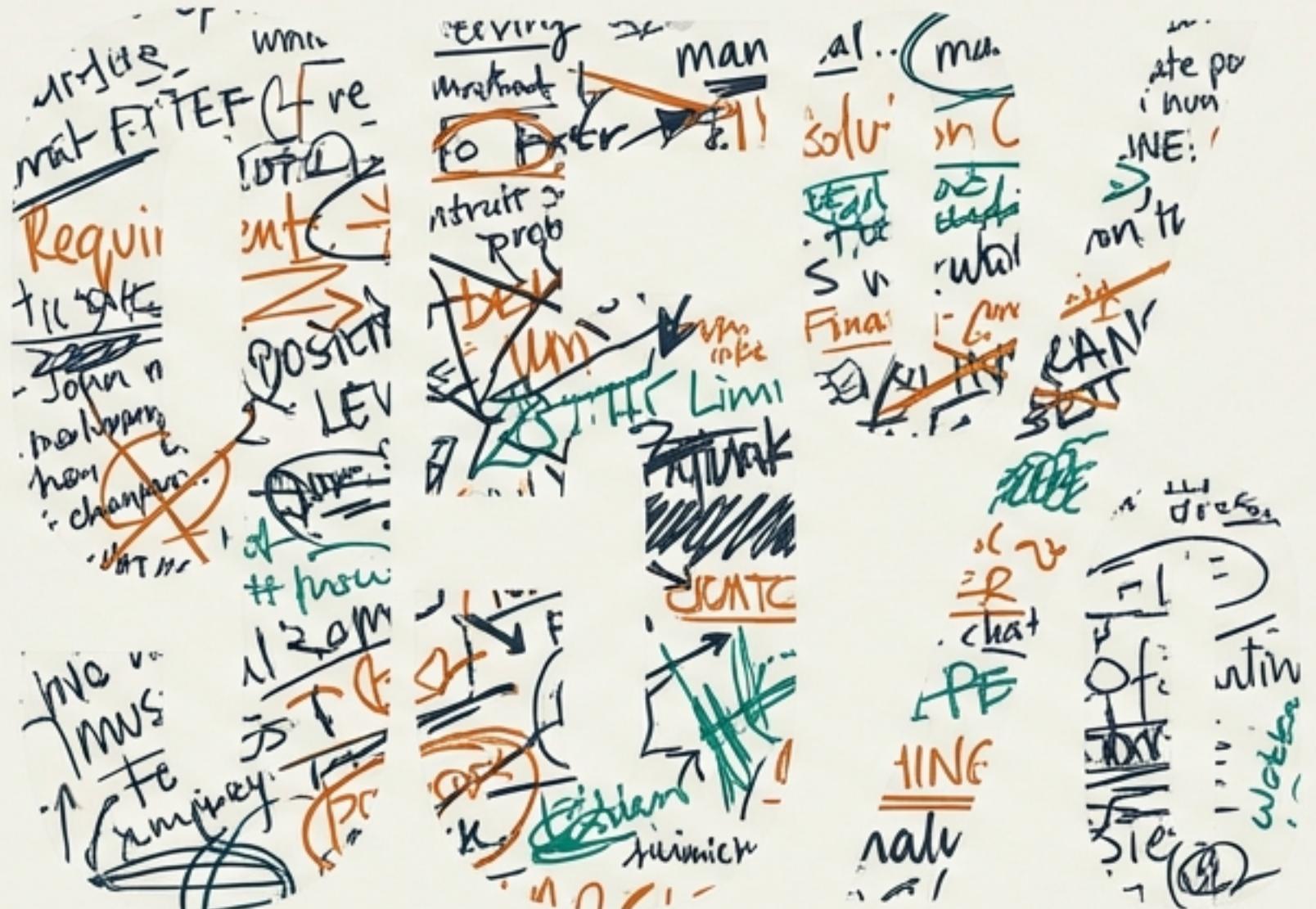


Natural Language Processing for Requirements Engineering

A Systematic Mapping Study

Source: ACM Computing Surveys, 2021
Authors: Liping Zhao et al.



of Requirements are Natural Language.

• The Imperative

The Problem:

Manual analysis is error-prone.

The Solution:

NLP4RE.

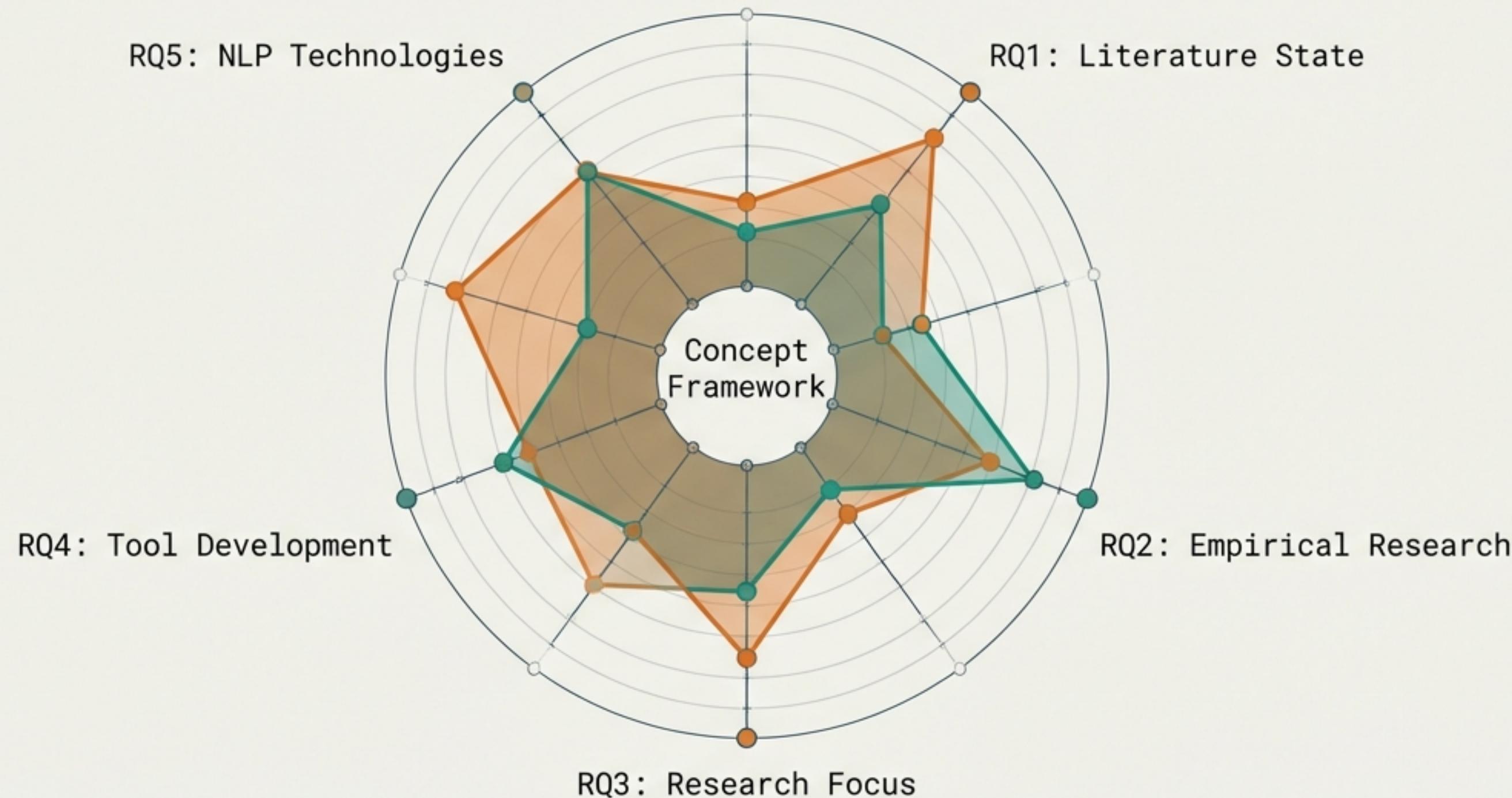
The Goal:

Assist humans.
Reduce ambiguity.

Automation

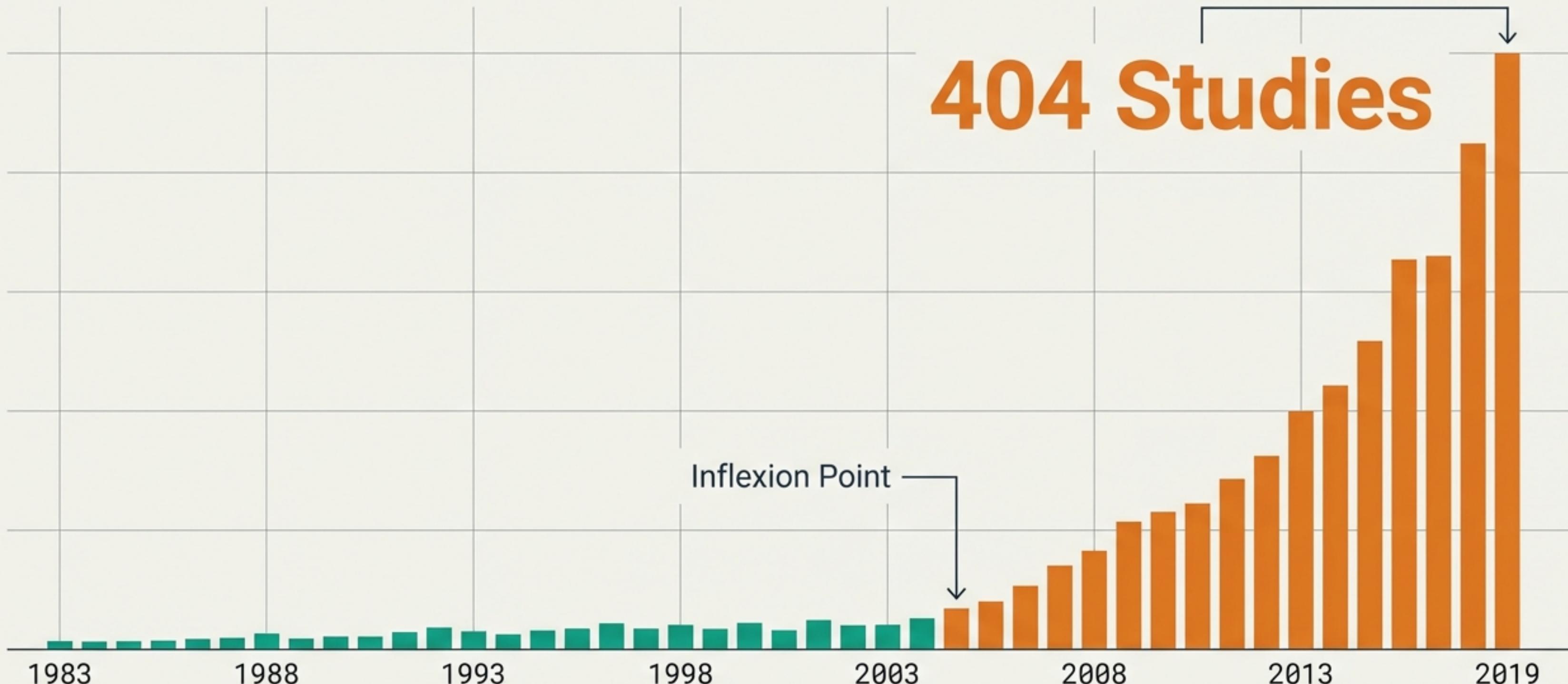
The Mission: Mapping the Field

Analyzing the landscape to answer five critical questions



A 36-Year Timeline of Explosive Growth

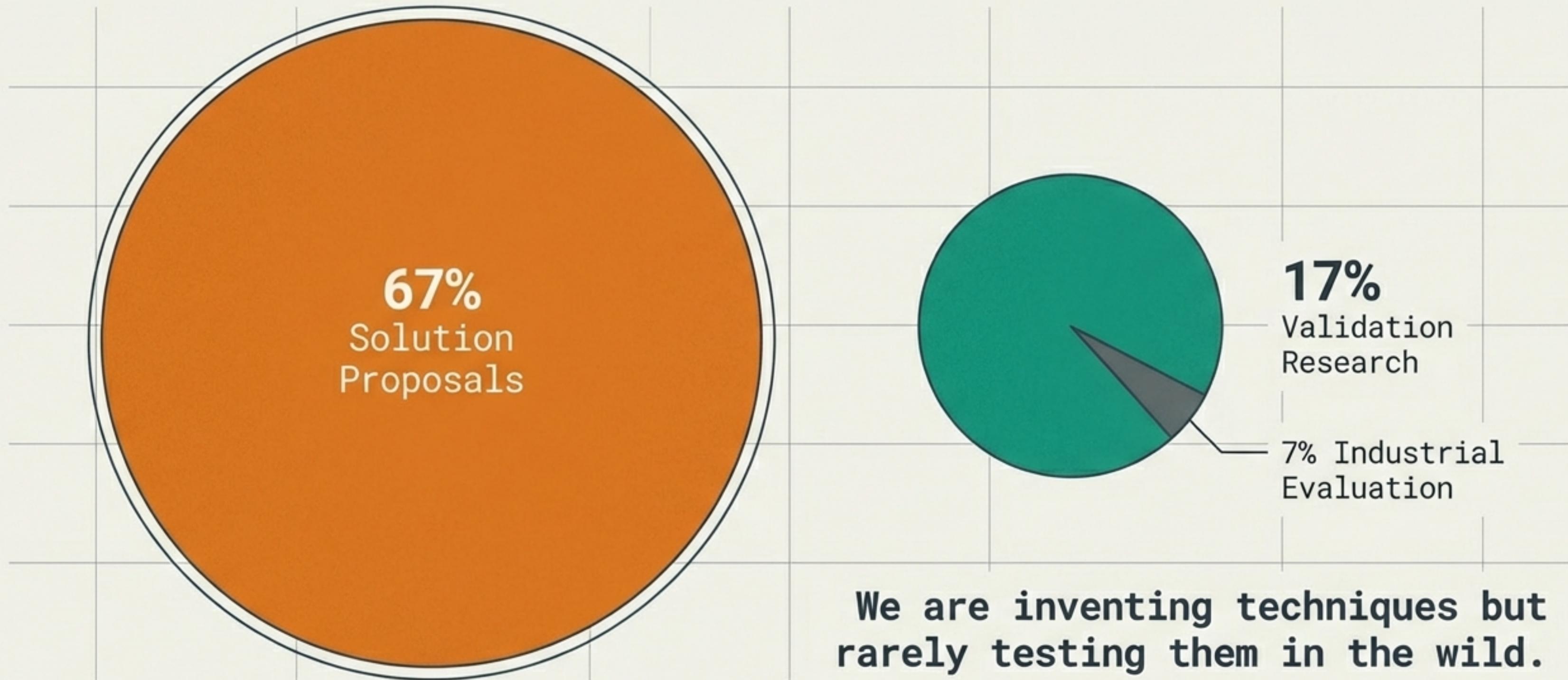
Analyzing the surge in research output from 1983 to 2019.



404 Studies

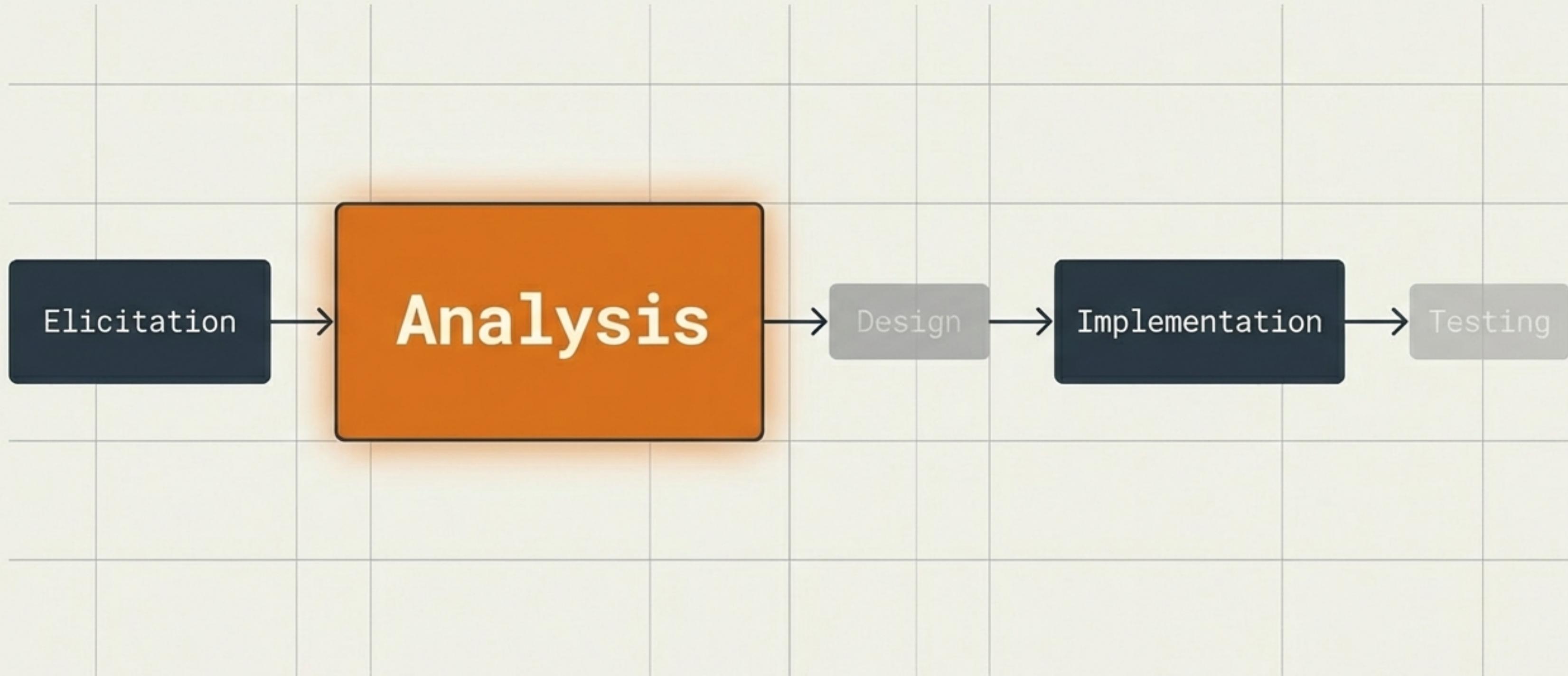
Inflexion Point

High Innovation, Low Empirical Validation



Targeting the Requirements Analysis Phase

Where NLP efforts are concentrated.



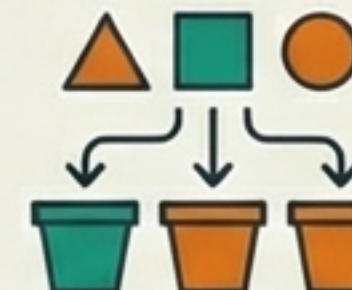
The Functional Capabilities of NLP4RE

Detection



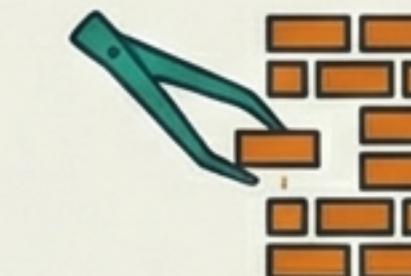
Identifying entities and patterns.

Classification



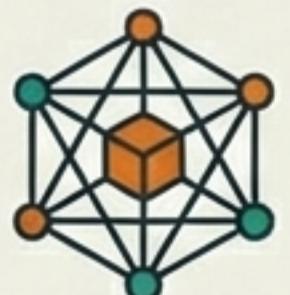
Categorizing information automatically.

Extraction



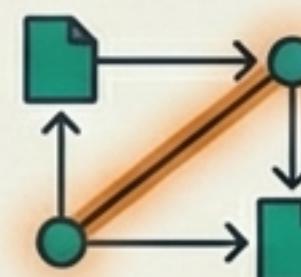
Pulling structured data from unstructured text.

Modeling



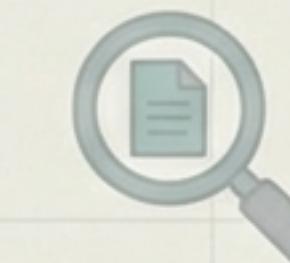
Representing knowledge and relationships.

Traceability



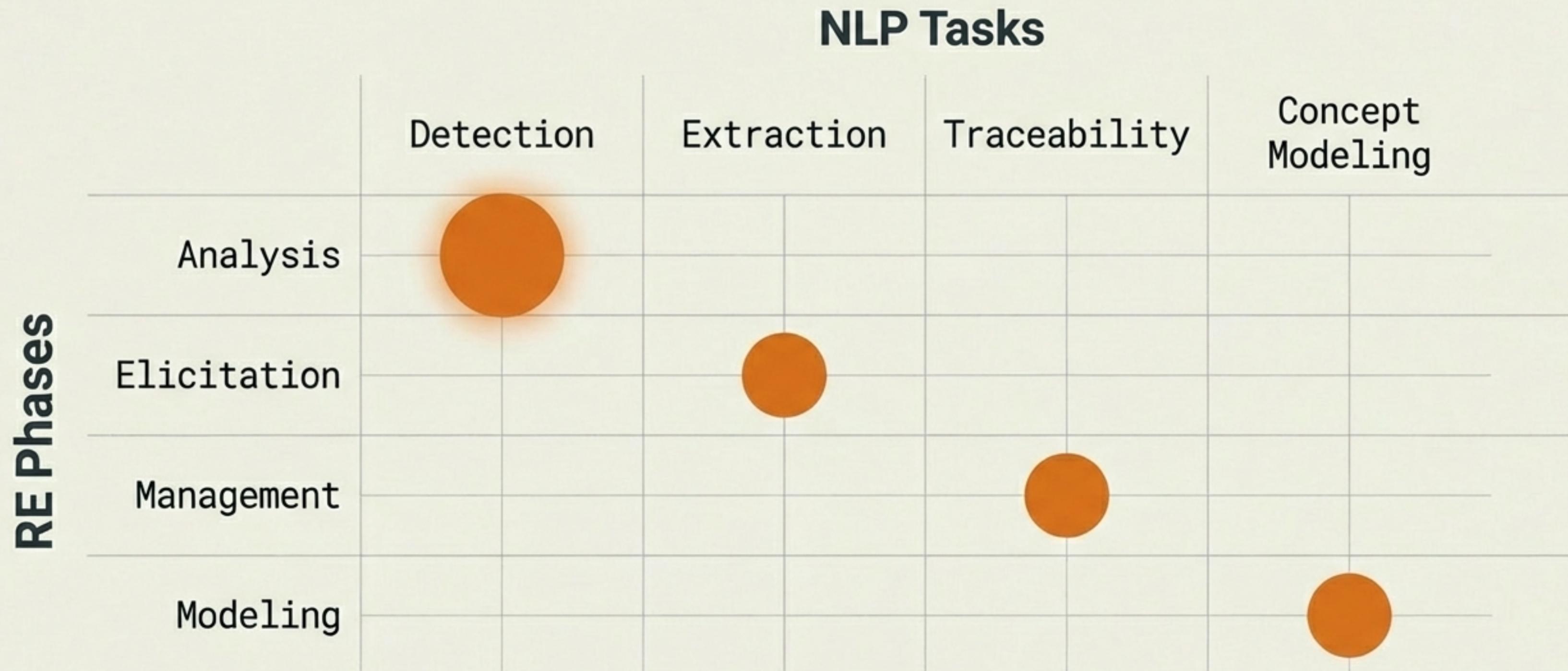
Linking requirements to downstream artifacts.

Search & Retrieval

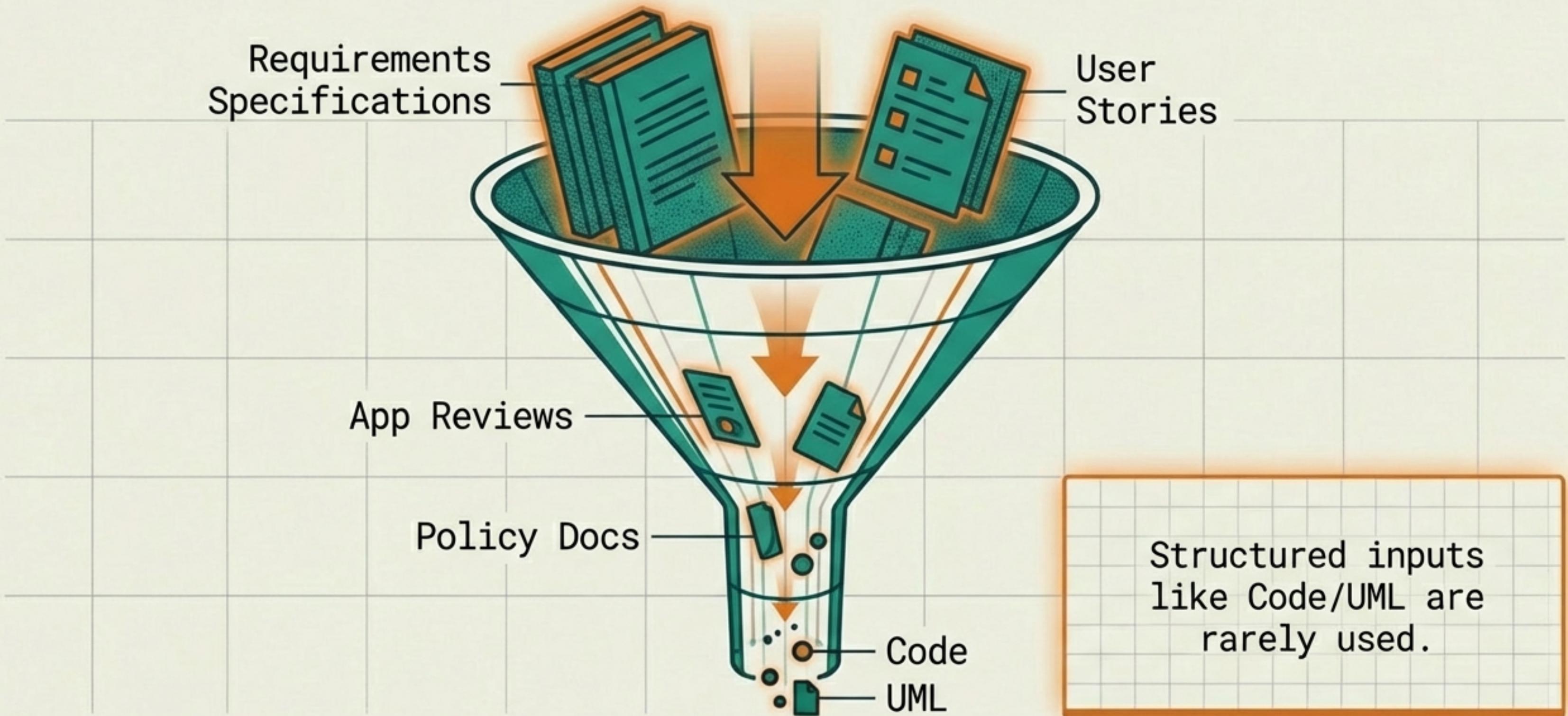


Finding relevant information.

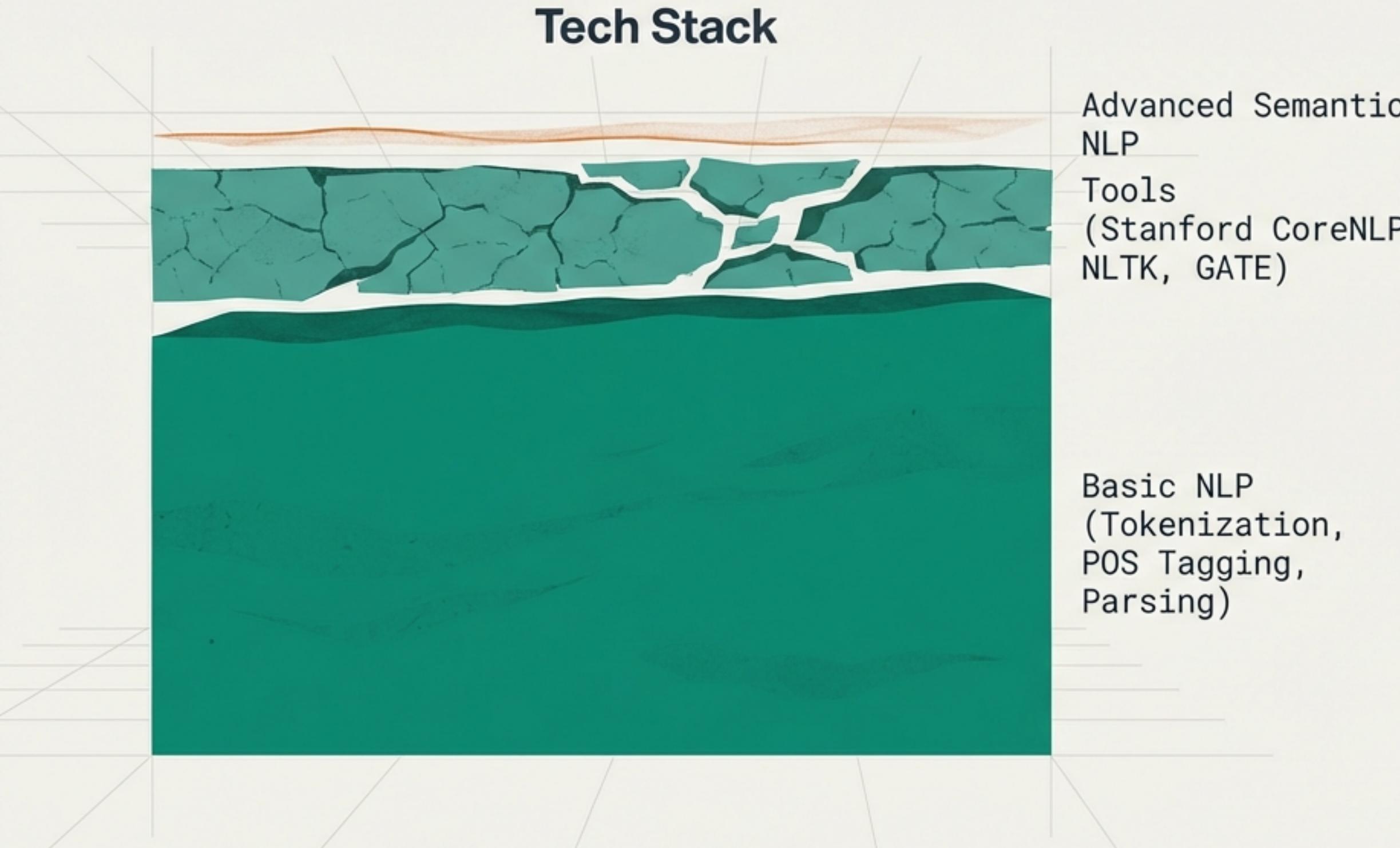
Aligning Linguistic Tasks with Engineering Phases



Input Data: The Dominance of Specifications



The Tooling Landscape: Prototypes & Basic NLP

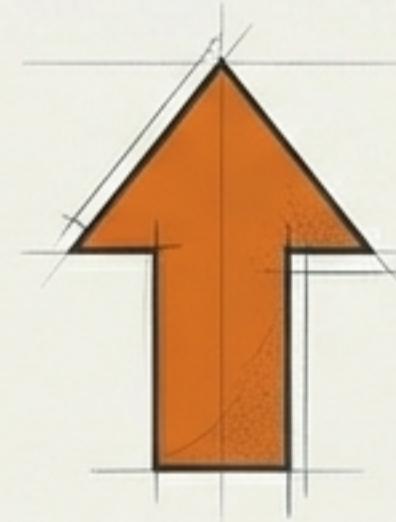


130 Tools

⚠ Only 13% Publicly Available

Verdict: A Field in Rapid but Isolated Growth

Trend



Explosive
Growth

Output

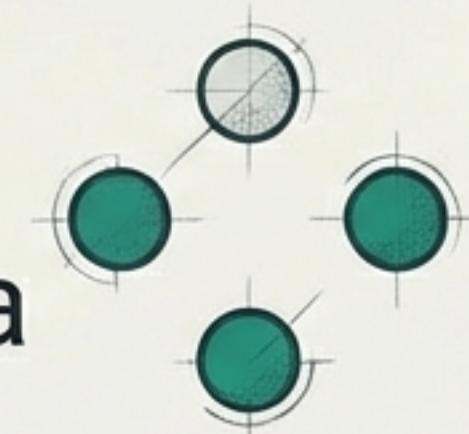
Solution
Proposals ➤ Validation

Tech

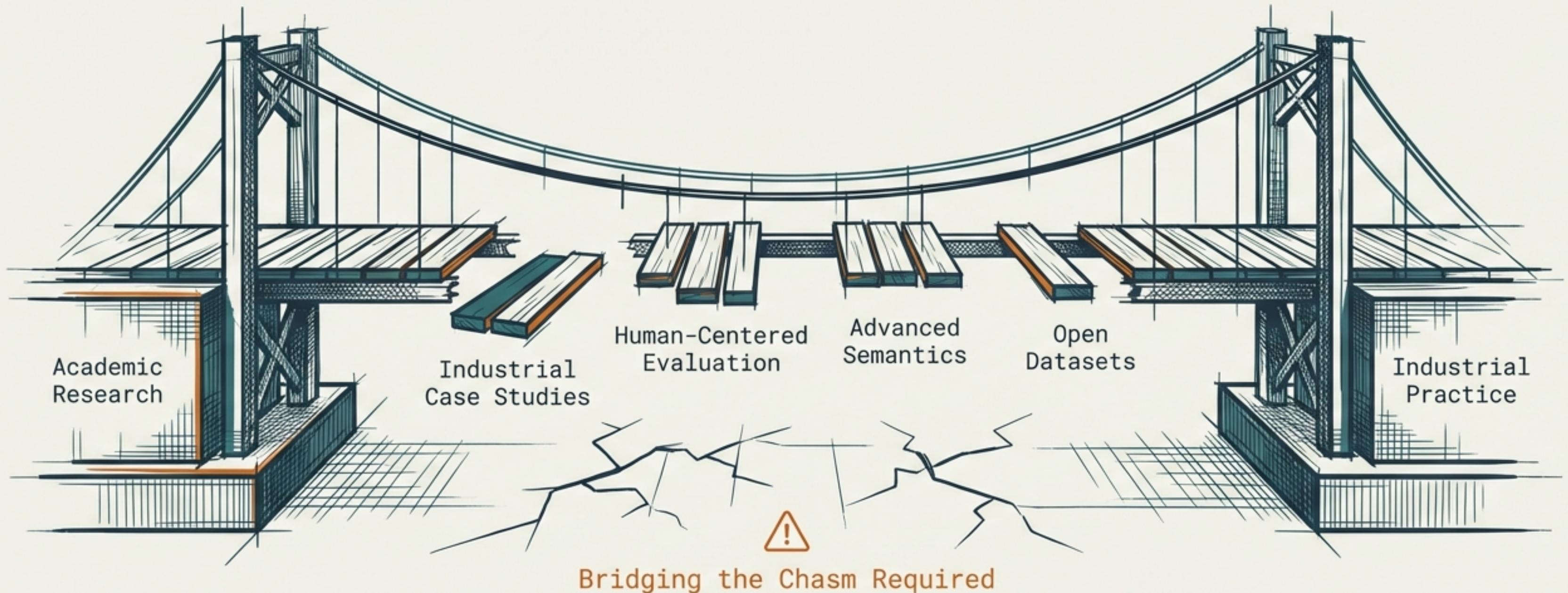
Syntax ➤ Semantics

Community

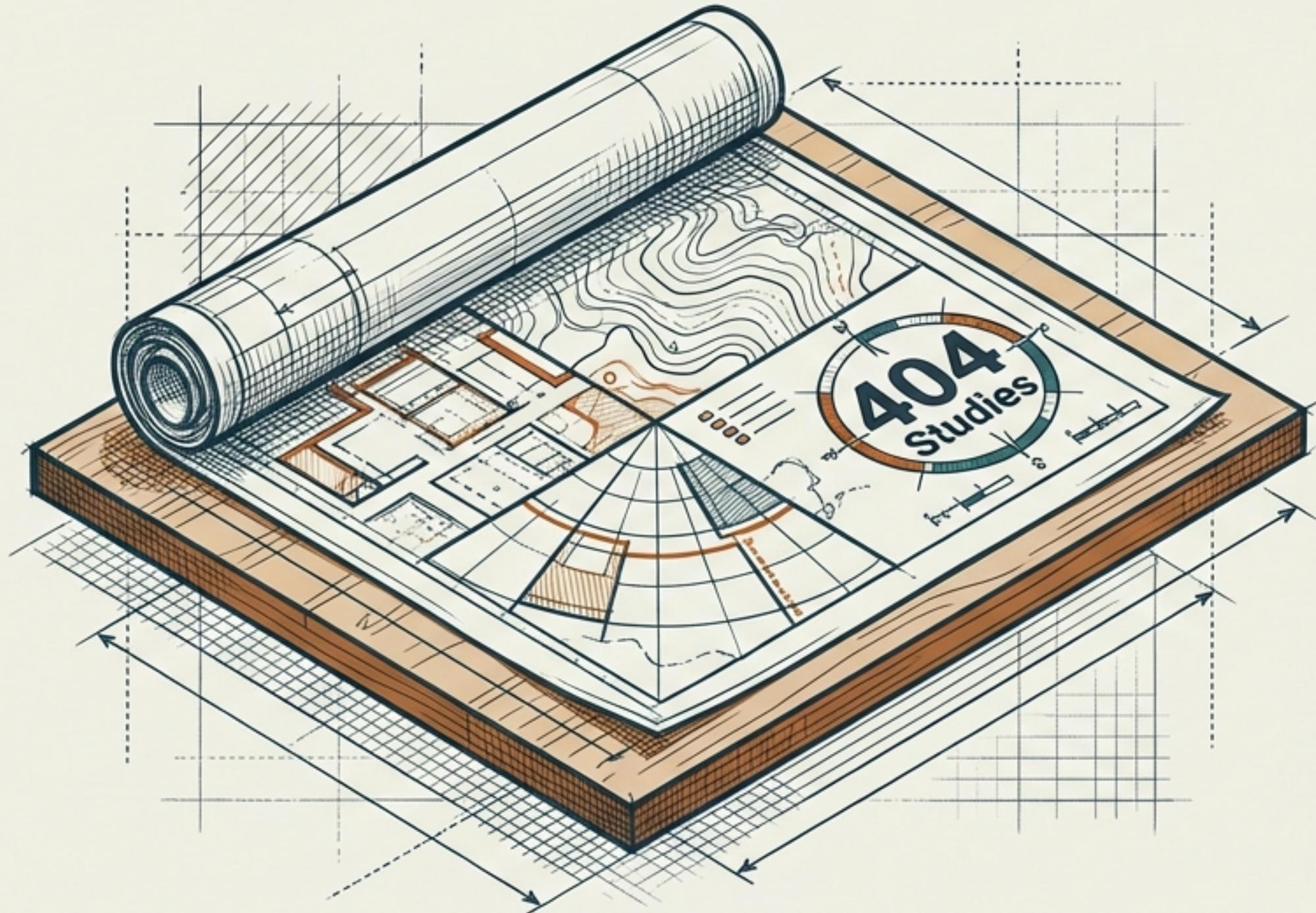
Isolated /
No Shared Data



Critical Gaps in the Current Landscape

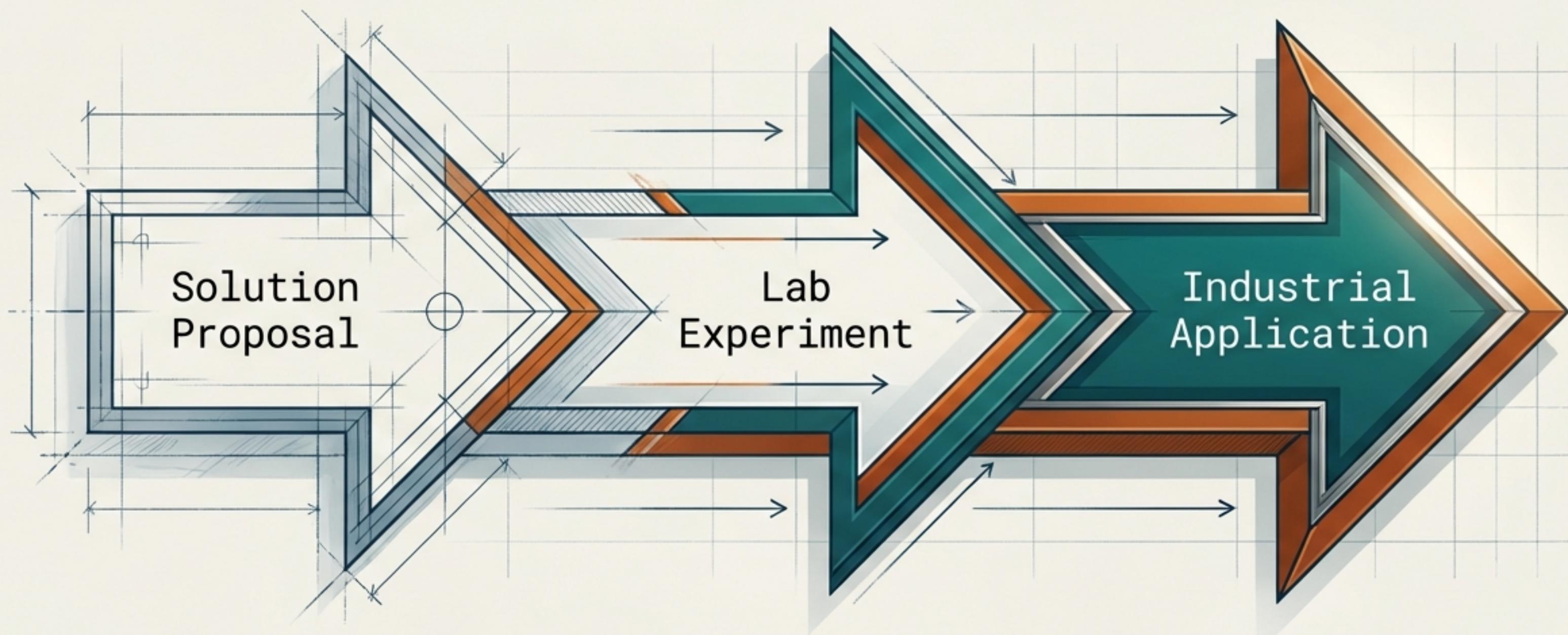


Contributions: Mapping the Territory



- Largest systematic mapping to date.
- Established a classification framework.
- Identified concrete trends & gaps.
- Foundation for future research.

The Path Toward Empirical Maturity



The opportunity exists to transform RE through rigorous, semantic, and human-centric AI.

**404 Studies.
36 Years.
One Framework.**

Natural Language Processing for Requirements Engineering:
A Systematic Mapping Study (Zhao et al., 2021)