



Refining Fragmented Lab Data into an **AI Knowledge Base**

AI-native platforms accelerate materials innovation by connecting data, knowledge, and decision-making.



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The Challenge of Fragmented R&D Knowledge

THE CHALLENGE

Why R&D Teams Still Struggle Despite Having More Data Than Ever

70%

of R&D knowledge is unstructured

60%

Reduction in Experimental Data Analysis Time

SOURCE OF KNOWLEDGE

Experimental Data

Technical Reports

Lab Notebooks

Emails & Discussions

Literature & Patents

Process Parameters

Characterization Results

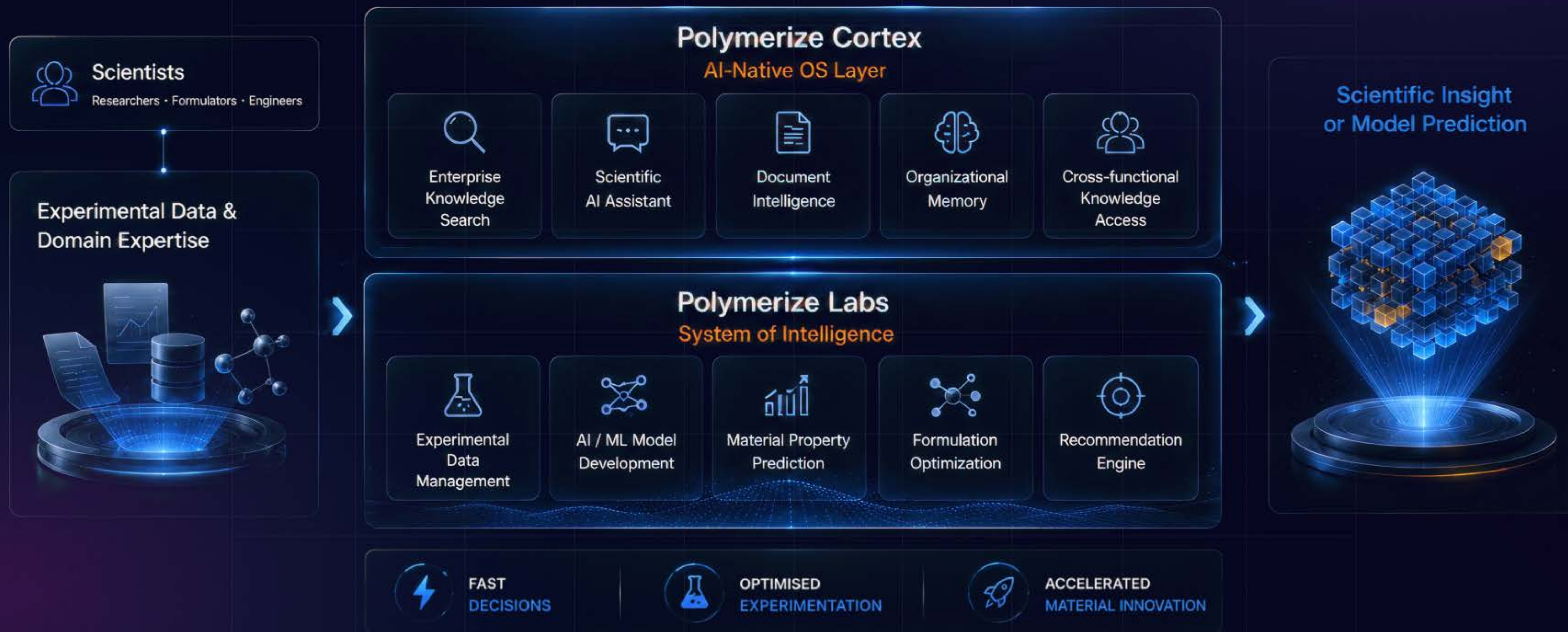
THE PROBLEM

- Knowledge trapped in silos
- Difficulty finding previous experiments
- Repeated trial-and-error work
- Loss of expertise when employees leave
- Decisions based on incomplete information
- AI initiatives limited by disconnected data



The AI-Native R&D Stack

From Organizational Knowledge to Scientific Intelligence



Disparate R&D Data Silos



SEM Image

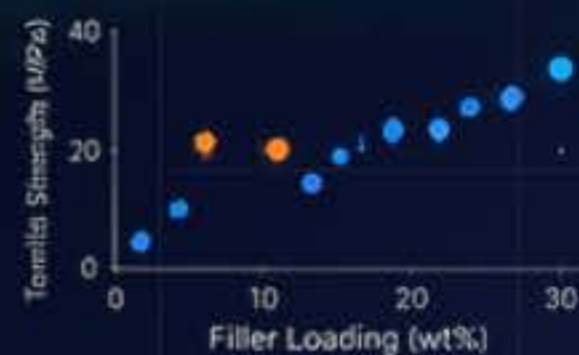


TDS Data

Property	Value	Unit
Density	0.90	g/cm ³
MFI	12	g/10 min
Tensile Strength	18	MPa
...		



Experiment Data



SMILES Data

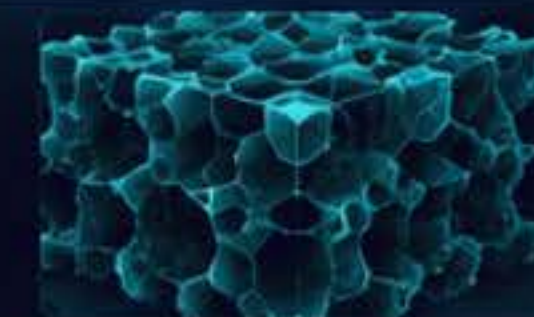
CC(C)C=O
C1=CC=CC=C1O
CC(C)(C)OC(=O)C
...


Polymerize
AI Native R&D Stack

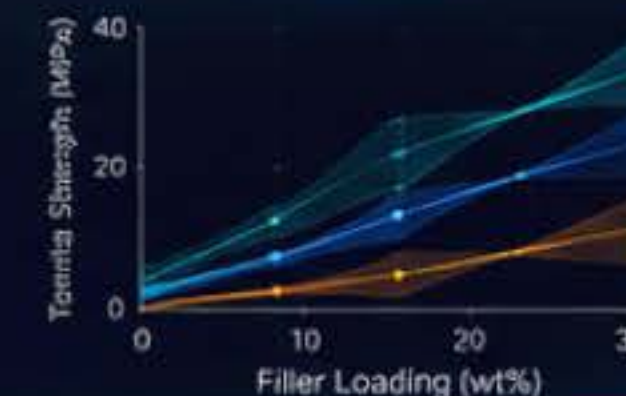
Integrated R&D Knowledge Base & Scientific



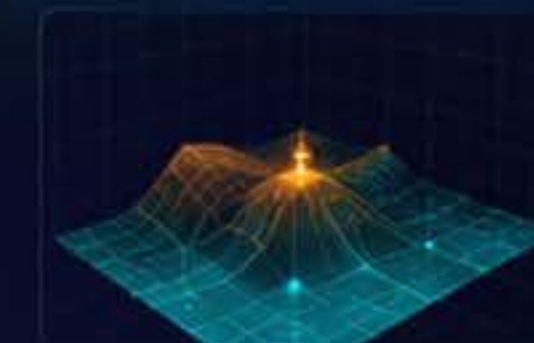
Refined Microstructure Data



Unified Property Knowledge



Smart Experiment Optimization



AI-Enriched Cheminformatics





THE AI-NATIVE R&D STACK

Industrial Case Study

Applying AI-native intelligence to
real-world materials challenges



PP/EPDM Composites for Under-the-Hood Automotive Applications

Applications:

Under-the-Hood Automotive Components



Company size

600



Industry

OEM

Data Sources Available:



Historic Experimental Data



SEM images



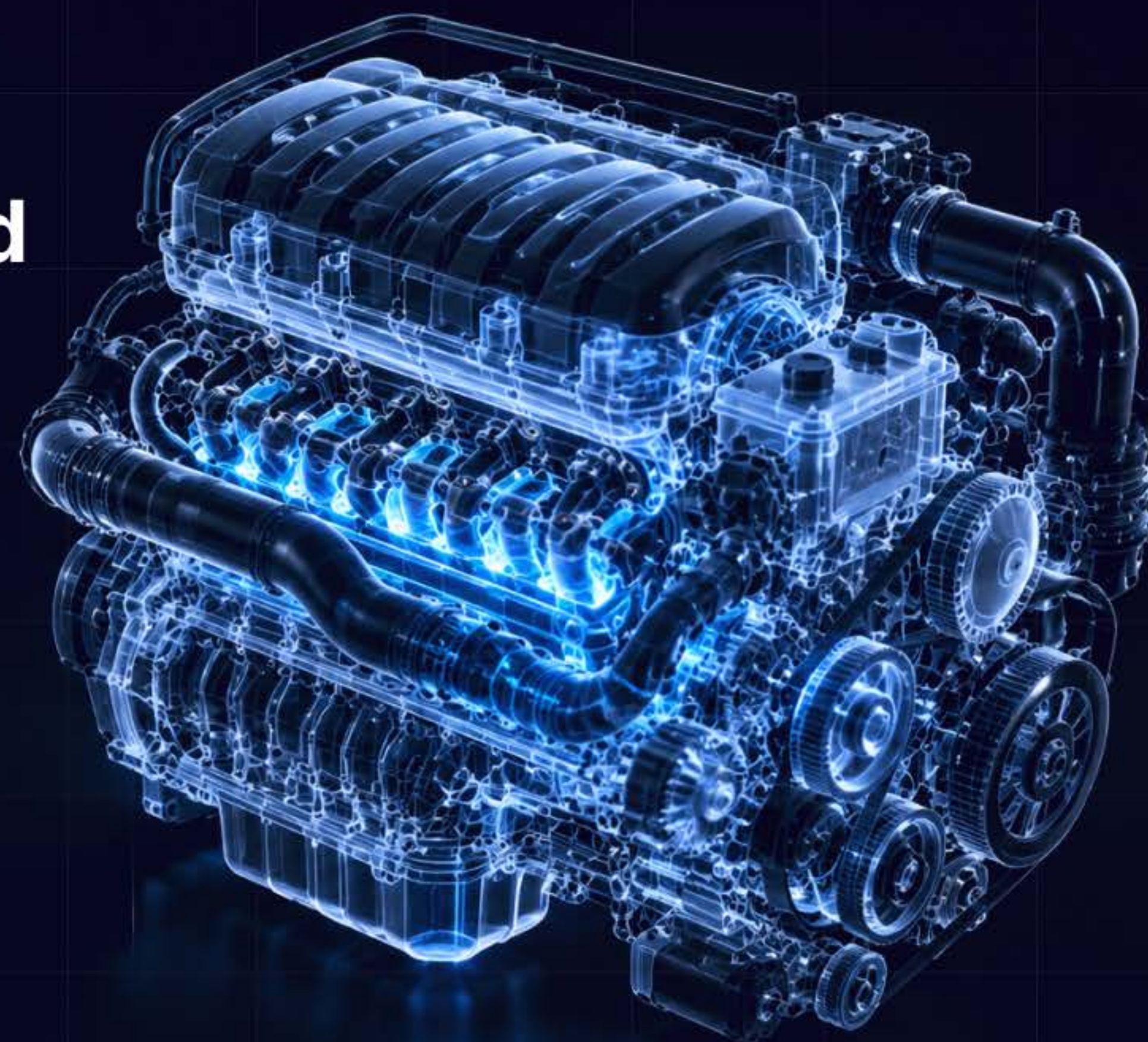
DSC data



TDS Documents



Processing Parameters



Requirements

Optimizing tensile strength in PP/EPDM composites for under-the-hood automotive components

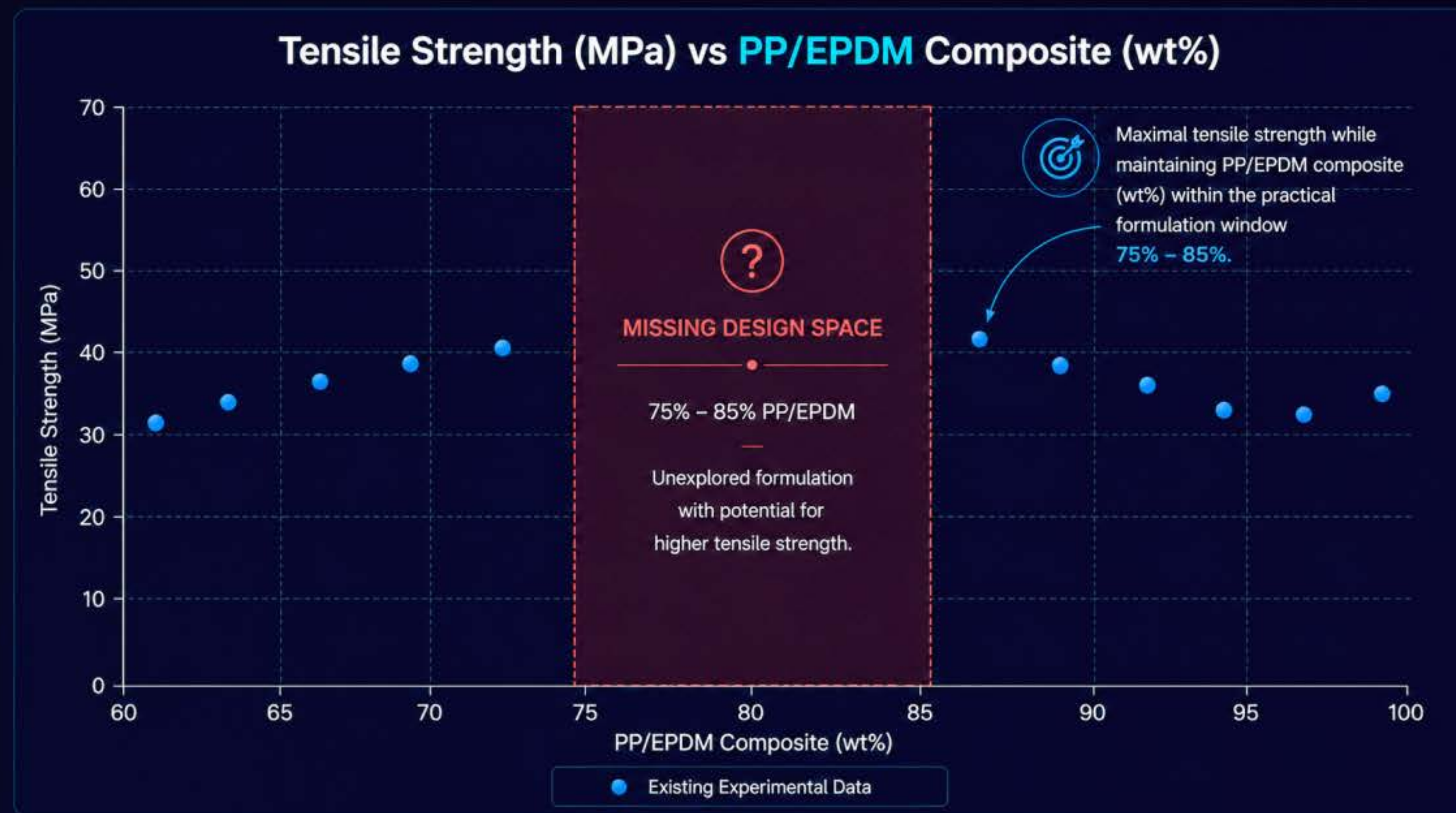
↓ Low filler loading.

↑ Increasing tensile strength

🛡️ Maintaining impact resistance

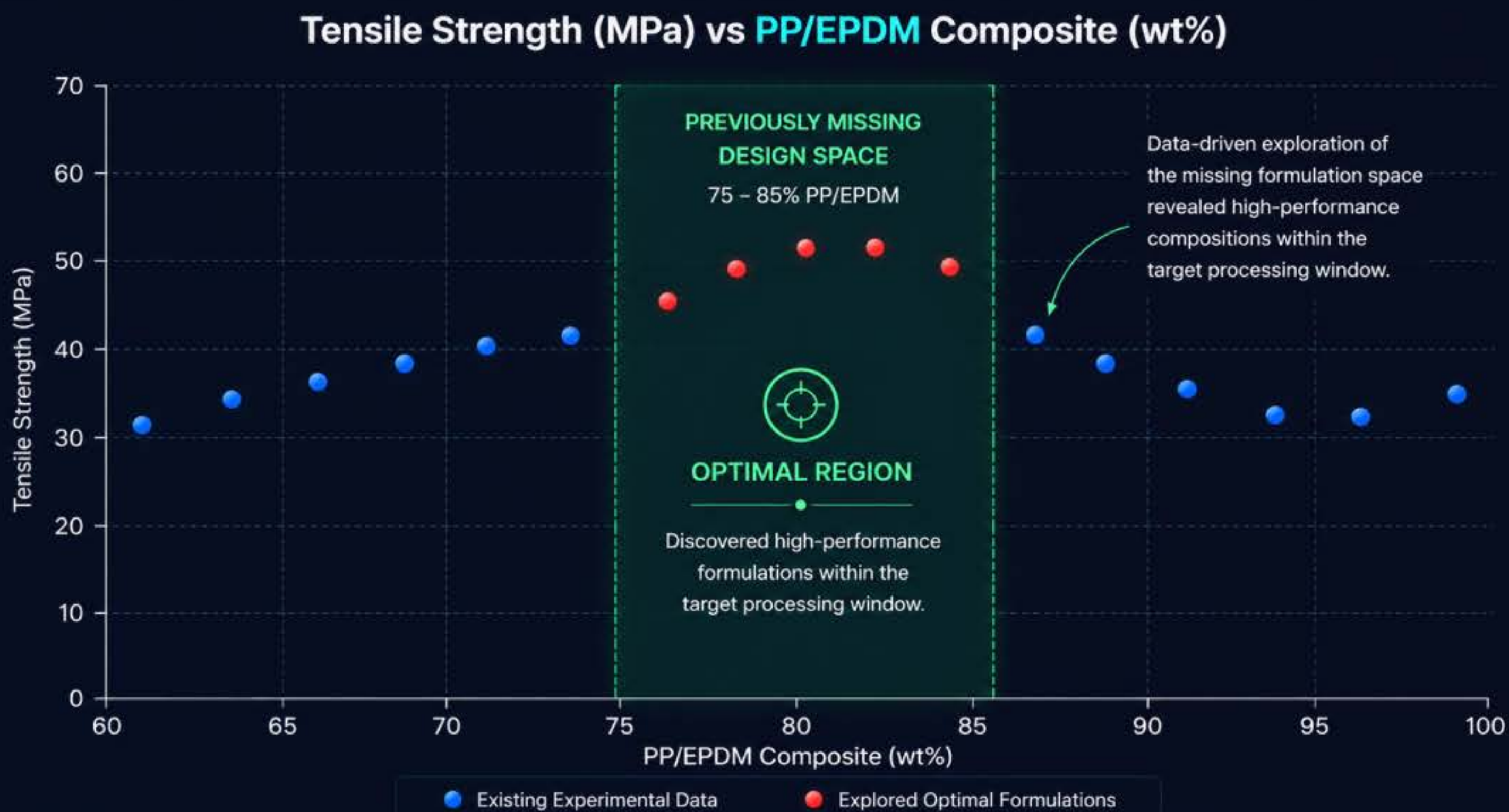
⚙️ Preserving processability

🔄 Minimizing development iterations



Discovering the Optimal Formulations

AI-driven exploration of the missing design space identifies high-performance PP/EPDM composites for under-the-hood automotive components.

**+15%**Increase in
Tensile Strength**40%**Fewer Experimental
Iterations**83%**Reduction in
Prediction Error

INDUSTRY APPLICATIONS

Discovering the Optimal Formulations

AI-driven exploration of the missing design space identifies high-performance PP/EPDM composites for under-the-hood automotive components.



+15%

Increase in
Tensile Strength



40%

Fewer Experimental
Iterations



83%

Reduction in
Prediction Error

Prediction Error Across Trials (Error %)

Trial	Experimental Data Only		Unified Knowledge Base (Polymerize)		Improvement
Trial 1	12%		3%		75% ↓
Trial 2	18%		5%		72% ↓
Trial 3	22%		2%		91% ↓
Trial 4	19%		2%		89% ↓



Average Prediction Error Reduced from 17.8% to 3.0% | **83% Overall Reduction**

Key Insights Generated:



SEM Analysis

Filler dispersion had a stronger influence on tensile strength than filler loading.



DSC Analysis

Integration of DSC data showed excessive EPDM reduced crystallinity and stiffness.



Integrated Intelligence

Integrated analysis reduced the need for exploratory trial-and-error experiments.

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Thank you

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“

**Transforming data into discoveries.
Discoveries into impact.**

”

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