Operationalizing Agentic AI in Trusted Engineering Workflows

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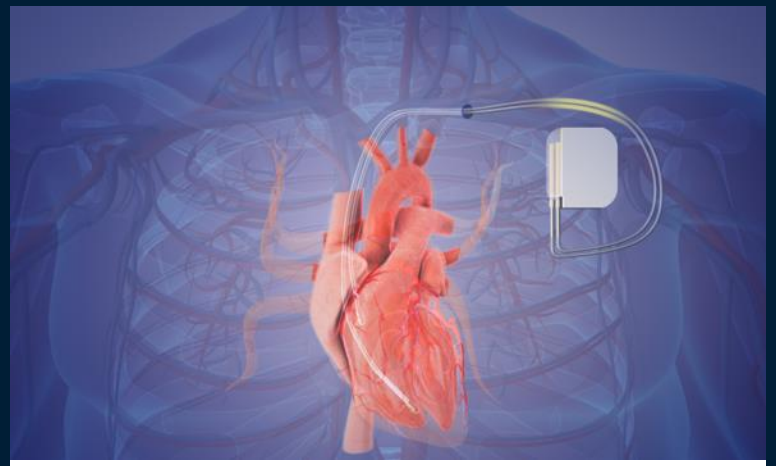


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What we will explore

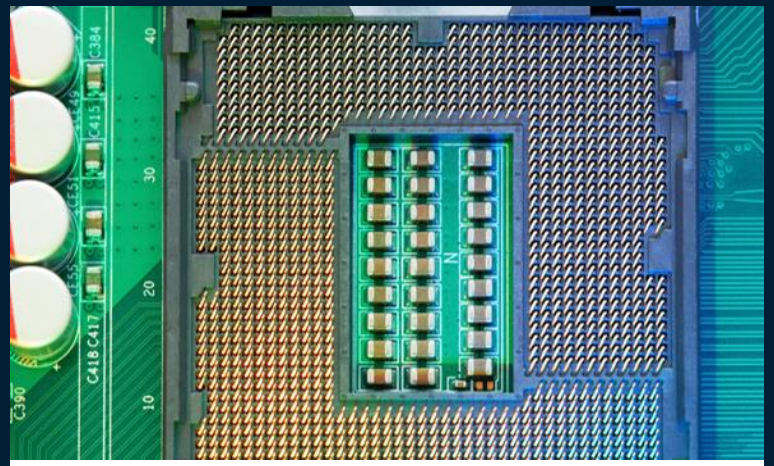
- Why engineering AI needs a trusted system context
- How agentic AI operationalizes an MBSE methodology
- Demo and adoption principles

AI in engineering is not new. What is changing is its role.



Medtronic

Detecting heart disorders in implantable cardiac monitors



Princeton University

Creating wireless chip designs



Eaton

Advancing solar power systems performance

Real-world systems need verifiable engineering

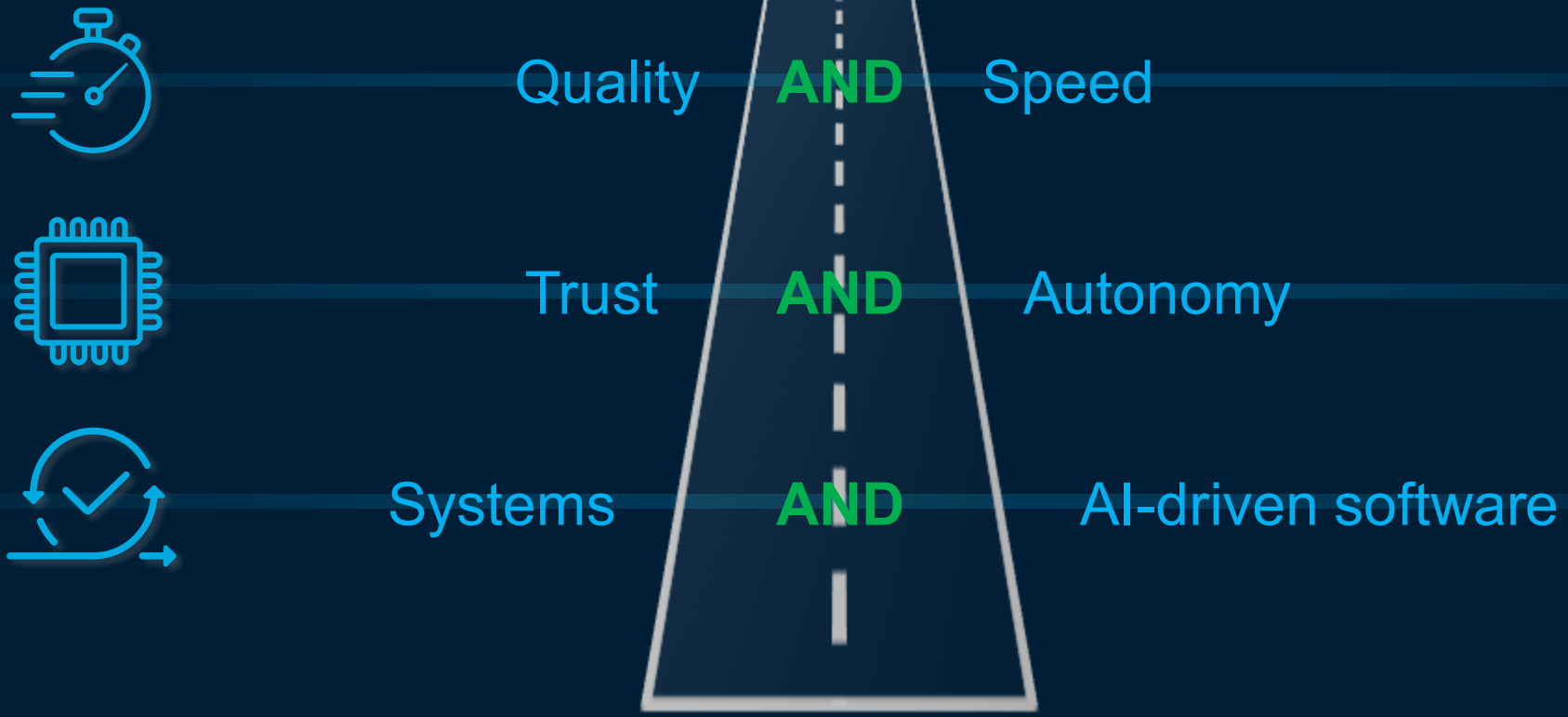




In engineering, useful AI must produce outcomes
that can be inspected, tested, and traced

AI value in engineering requires a trusted foundation

Trusted engineering tools + **GenAI**

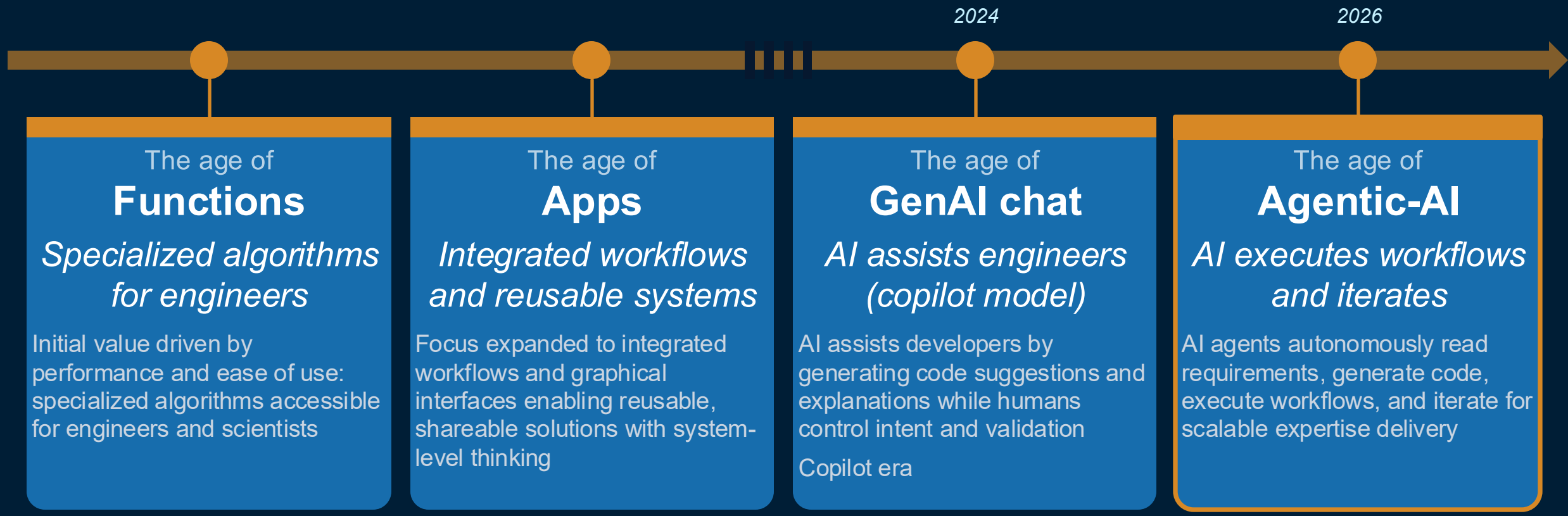


Quality **AND** Speed

Trust **AND** Autonomy

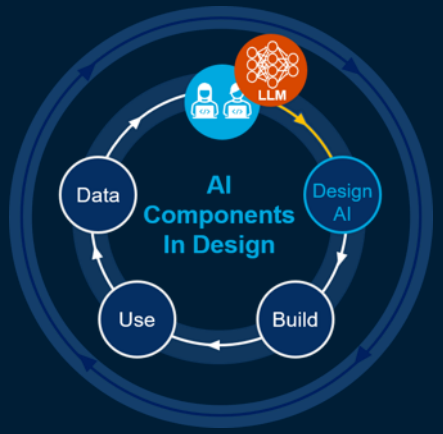
Systems **AND** AI-driven software

The evolution of computing eras



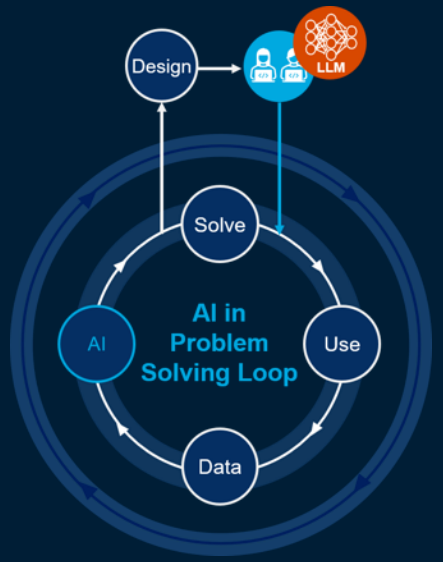
GenAI meets where you are

Two pathways to AI-augmented Model-Based Design



Integrated AI

- Embedded in the engineering environment
- Grounded assistance
- Minimal setup



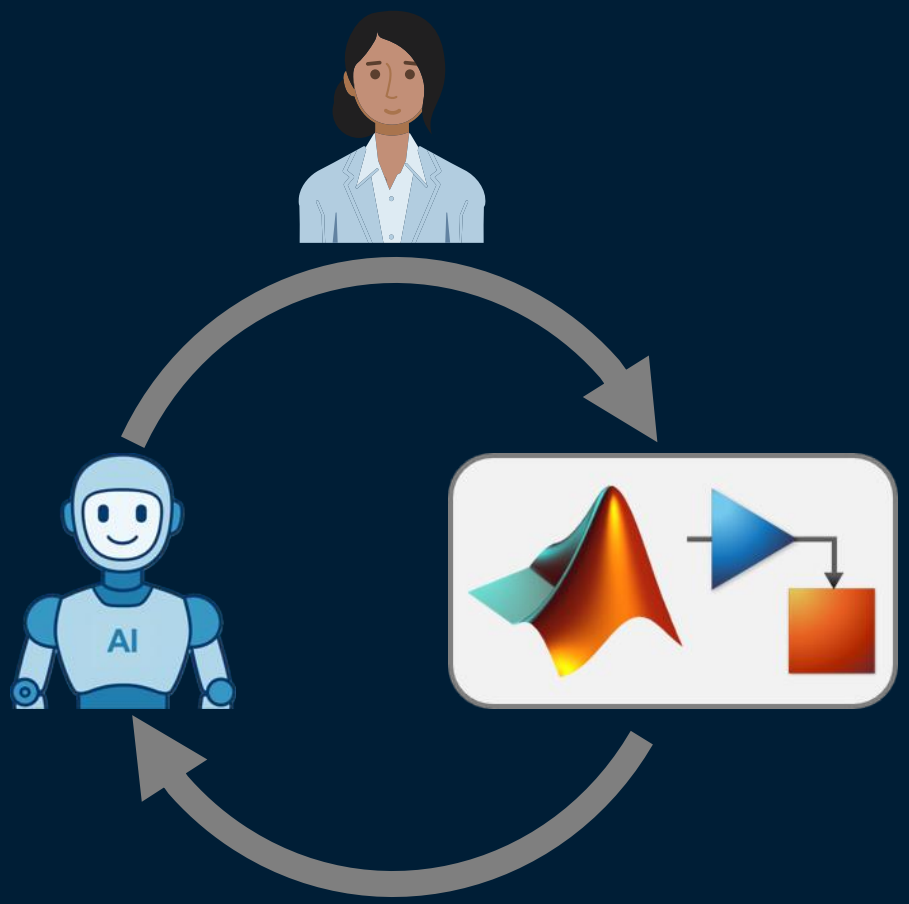
Agentic AI

- Connects external agents to engineering workflows
- Executes through tools and skills
- Flexible agent and LLM infrastructure

Simulink Agentic Toolkit

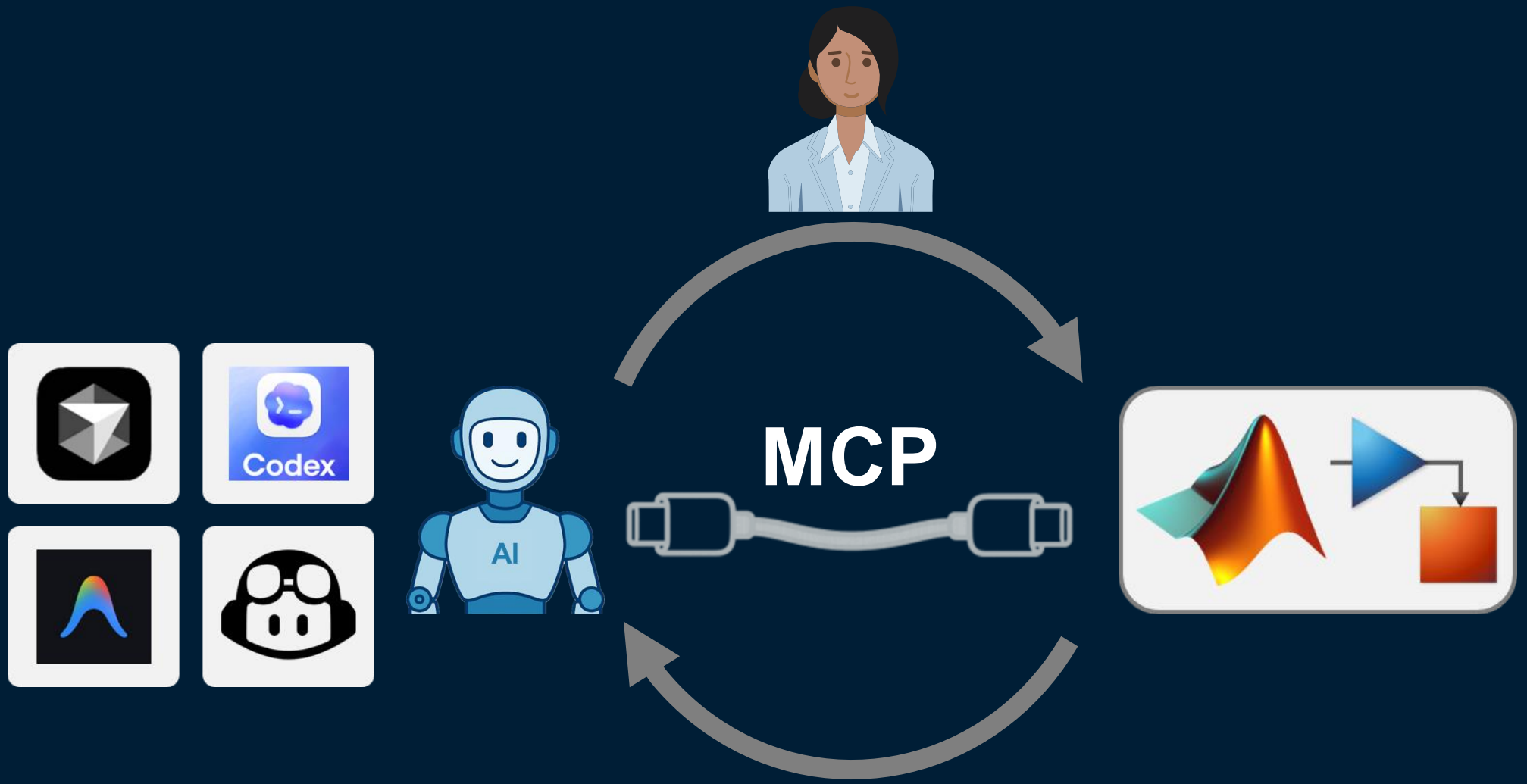
Enable your AI agents to work effectively with Simulink and Model-Based Design

- **Execution**
  AI executes engineering tasks, not just suggestions
- **Orchestration**
  Workflows become structured, repeatable, and scalable
- **Iteration**
  Systems evolve through continuous iteration



AI becomes part of the engineering loop

MCP enables agentic workflows



Connecting external AI to MATLAB



External AI Agent

- Orchestrates workflows across tools

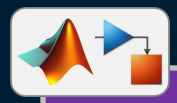
connects via



MCP

connection layer

- Standard interface to MATLAB
- Enables integration with different agents



MATLAB

- Executes engineering tasks
- Uses models and domain knowledge

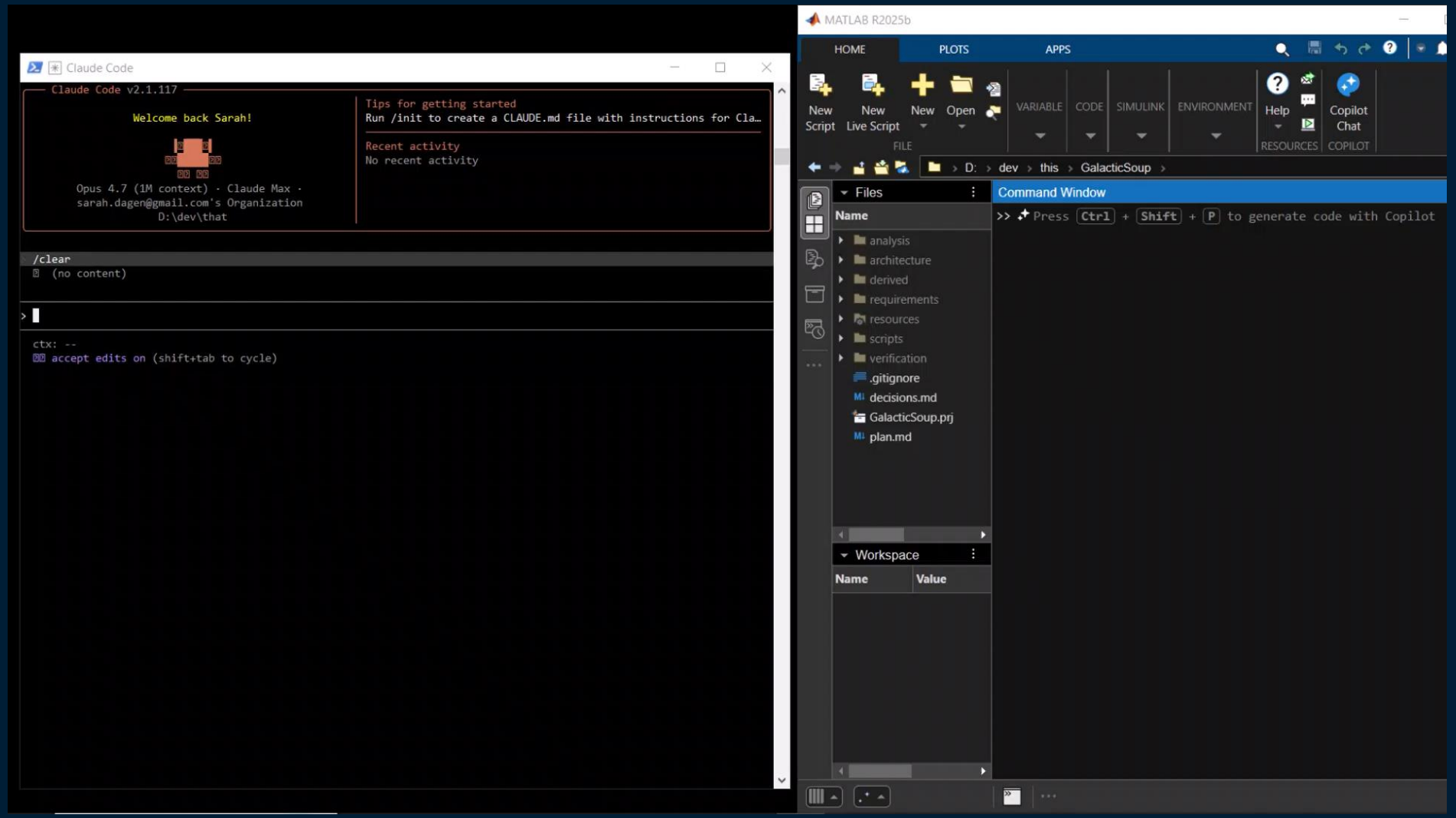
Decouples agent from execution environment

provides

Agentic Toolkit

Skills & plugins

Demo: from stakeholder needs to traceable architecture



Model-Based Systems Engineering

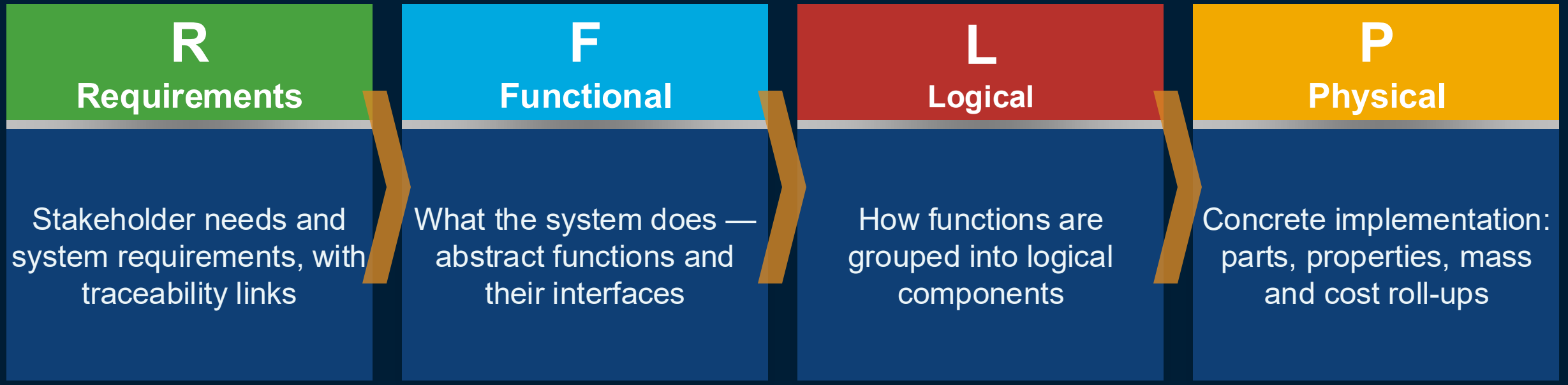
Managing system complexity with MBSE

MBSE replaces or augments document-centered workflows with models, connecting what you already do in Simulink into a system-level picture

See the whole system	Single source of truth	Traceability across the lifecycle	Earlier system-level validation
• Capture architecture, interfaces, and interactions beyond individual Simulink models • Avoid integration surprises later	• Requirements, architecture, and design all connected • Reduces inconsistencies and misalignment	• Requirement → architecture → behavior → test • Faster impact analysis and change management	• Simulate system behavior in context (not just component behavior) • Catch issues when they're cheap to fix

Methodology-based workflow orchestration

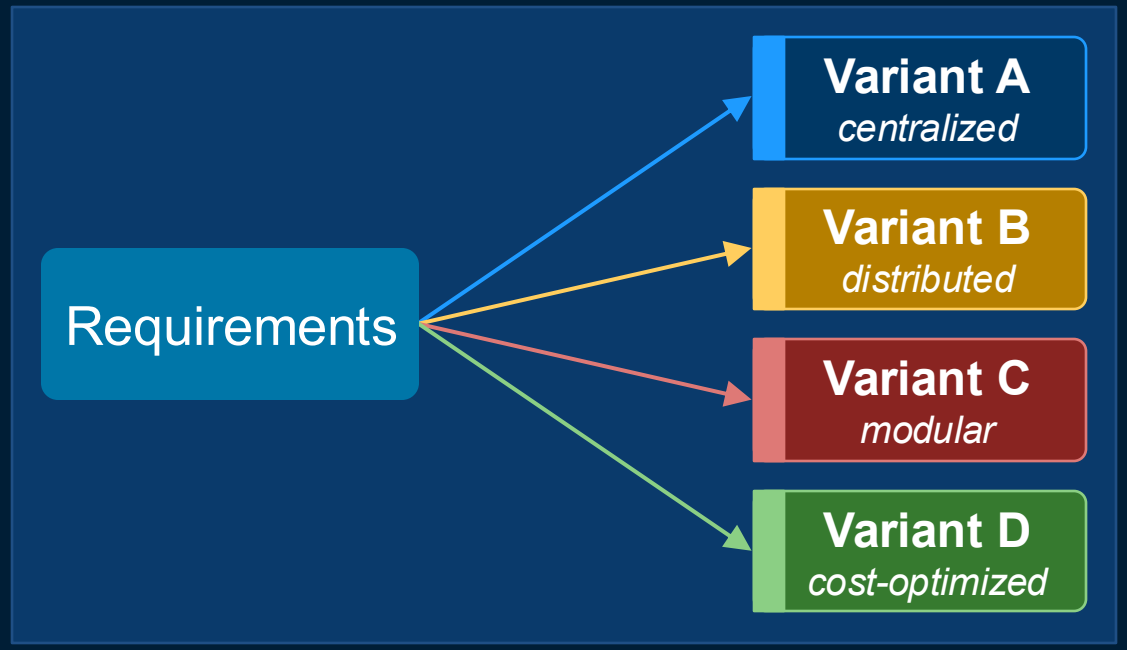
A staged approach that turns intent into traceable architecture



The value is not faster artifact generation. It is faster, traceable exploration before commitment

Why this matters

Where agentic AI creates early value



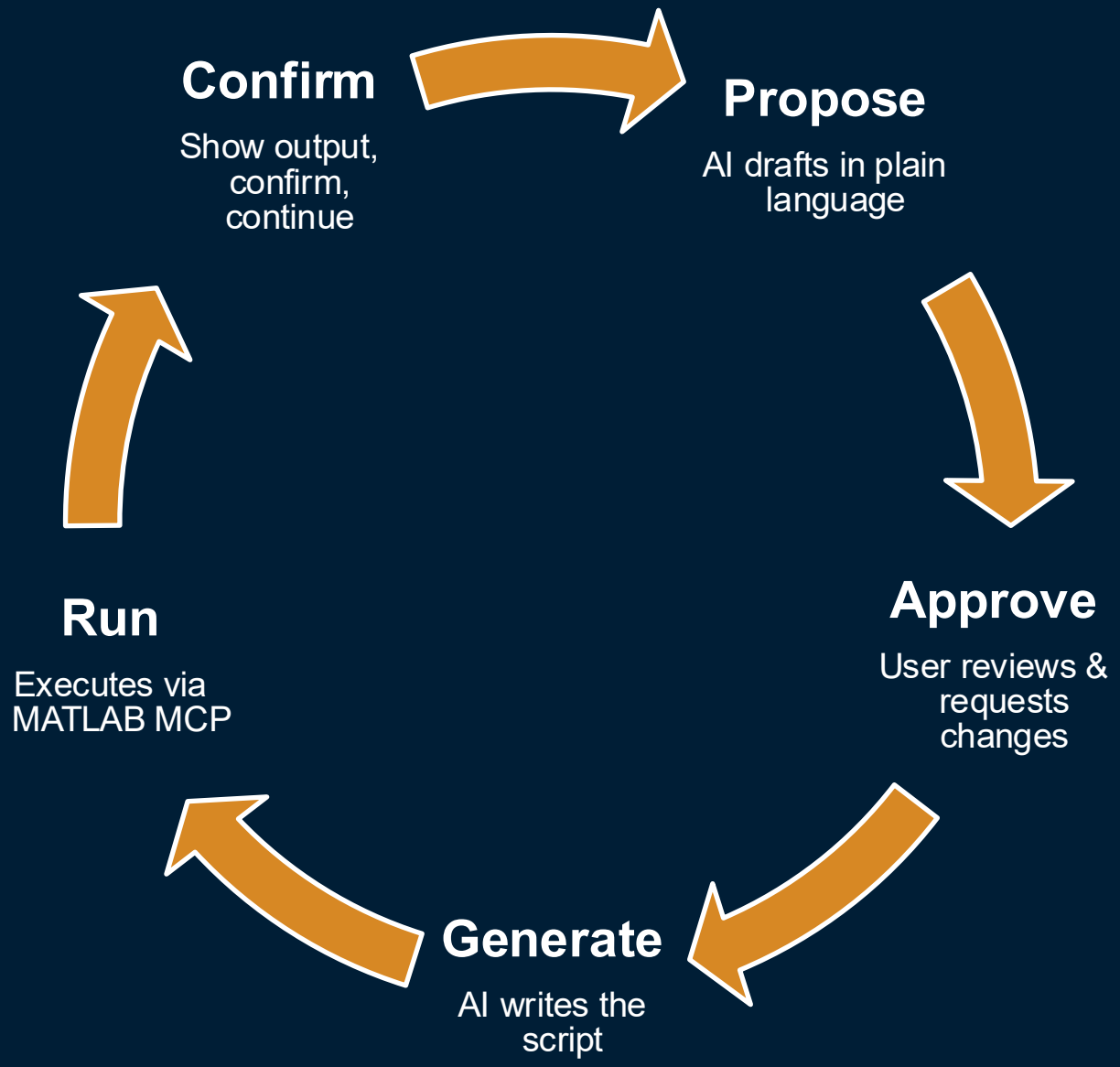
- **Explore architectural alternatives**
  One requirements set → multiple design options
- **Expose requirement ambiguities earlier**
  Questions emerge before design reviews
- **Reduce the cost of decisions**
  Evaluate alternatives before committing

How it's built

Five skills, one repeating loop

SKILLS

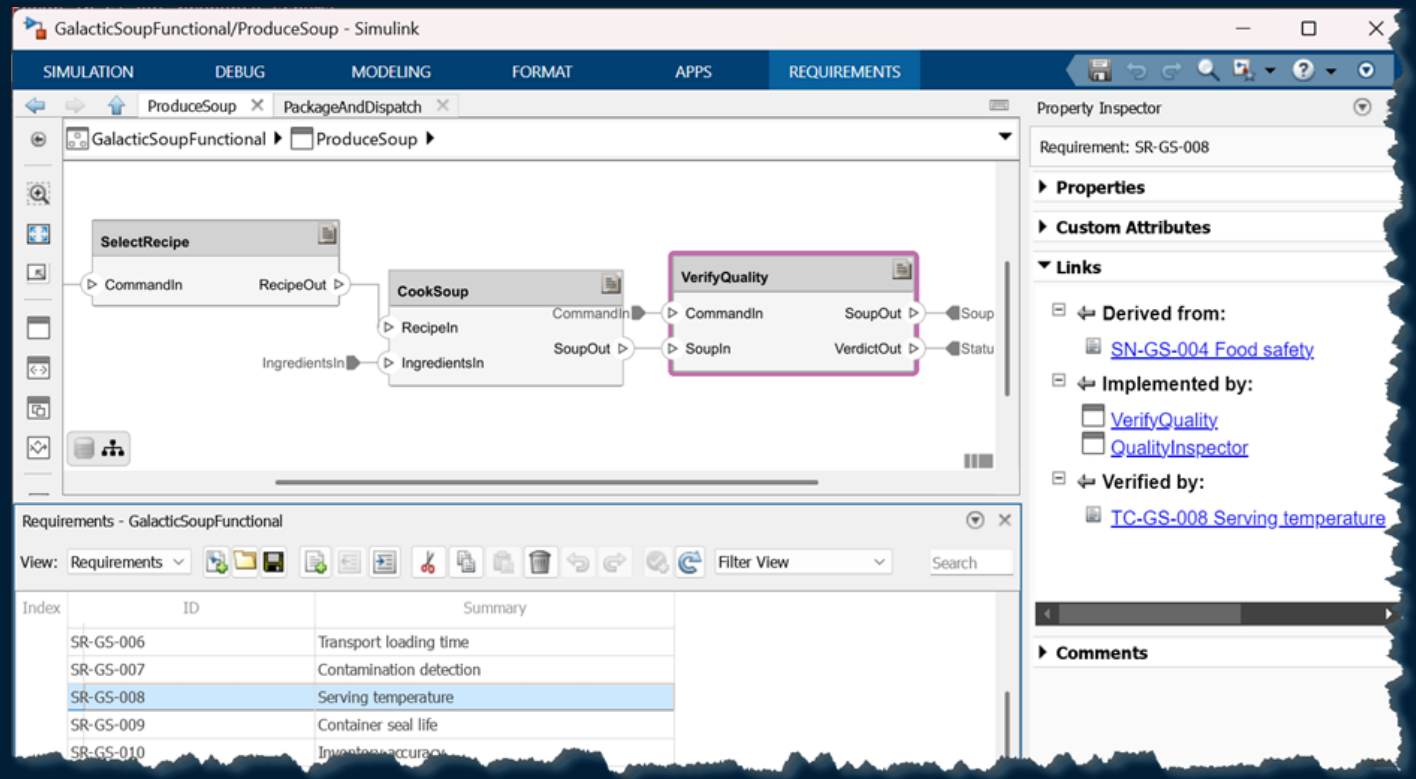
`mbse-workflow`	Guided end-to-end RFLP workflow
`matlab-project`	Project structure, APIs, integrity checks
`system-composer`	System Composer API reference
`mbse-architecture`	F/L/P, interfaces, stereotypes, allocations
`simulink-requirements`	Requirements Toolbox API reference



Traceability

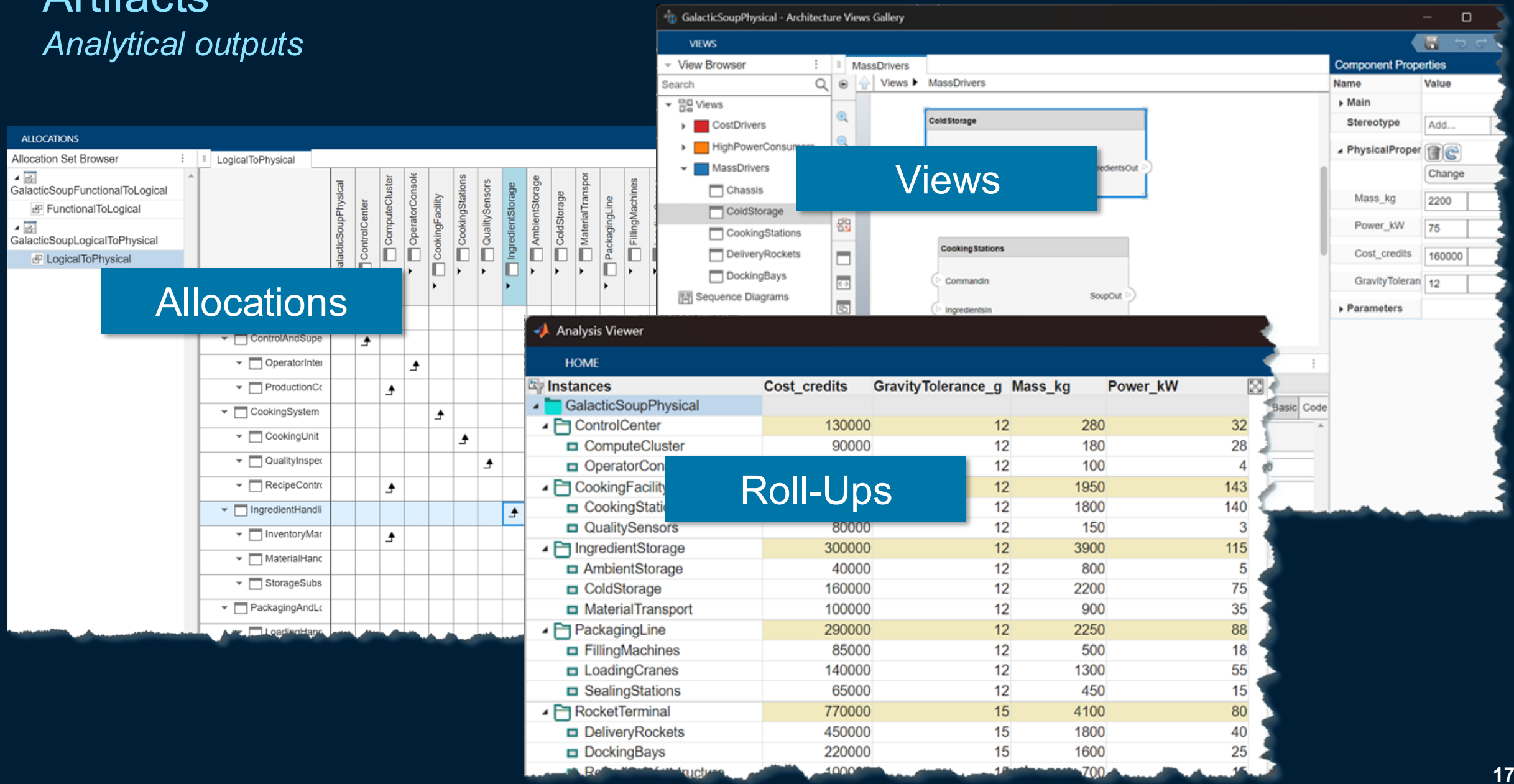
Stakeholder needs in, traceable system architectures out

	C	D
1	Description	Rationale
2	System shall cook at least 8 distinct recipes selectable at runtime.	Eight recipes gives menu variety while staying within ingredien
3	System shall sustain total throughput of at least 200 bowls/hour.	200 bowls/hour matches expected peak order rate aggregated
4	System shall achieve average automation level of at least 0.8 across components.	0.8 automation lets the 5-operator crew cover a 24/7 facility wit
5	System shall require at most 5 concurrent operators at peak load.	Facility berthing and life support are sized for a 5-person crew
6	System shall generate a shipping manifest per batch including destination.	Manifest is required for customs, transport routing, and recipie
7	System shall load packaged soup onto transport within 10 minutes of packaging.	10-minute window keeps loading pipeline aligned with the 200



Artifacts

Analytical outputs



Bootstrap with scripts – Maintain in place



Phase 1

Bootstrap

Script-driven generation

Agent writes & runs scripts that create the project, requirements, architectures, and allocations from scratch.

Fast, but every run is a full rebuild.



Transition

Steady state

Project takes shape

Architectures are reviewed, refined, and committed.

Re-running the bootstrap workflow now would clobber real work and pollute the git history.



Phase 2

Maintenance

In-situ edits via skills

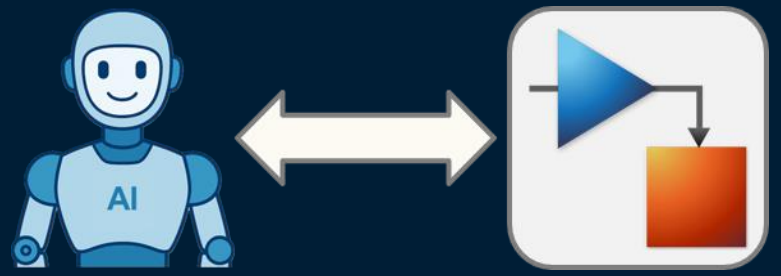
Use the skills' in-place editing APIs: add a requirement, link it to this component, regenerate just the allocation matrix.

Surgical changes, clean diffs.

Where this pays off

Faster initial artifacts · Controlled evolution · Methodology compliance by design

Key takeaways



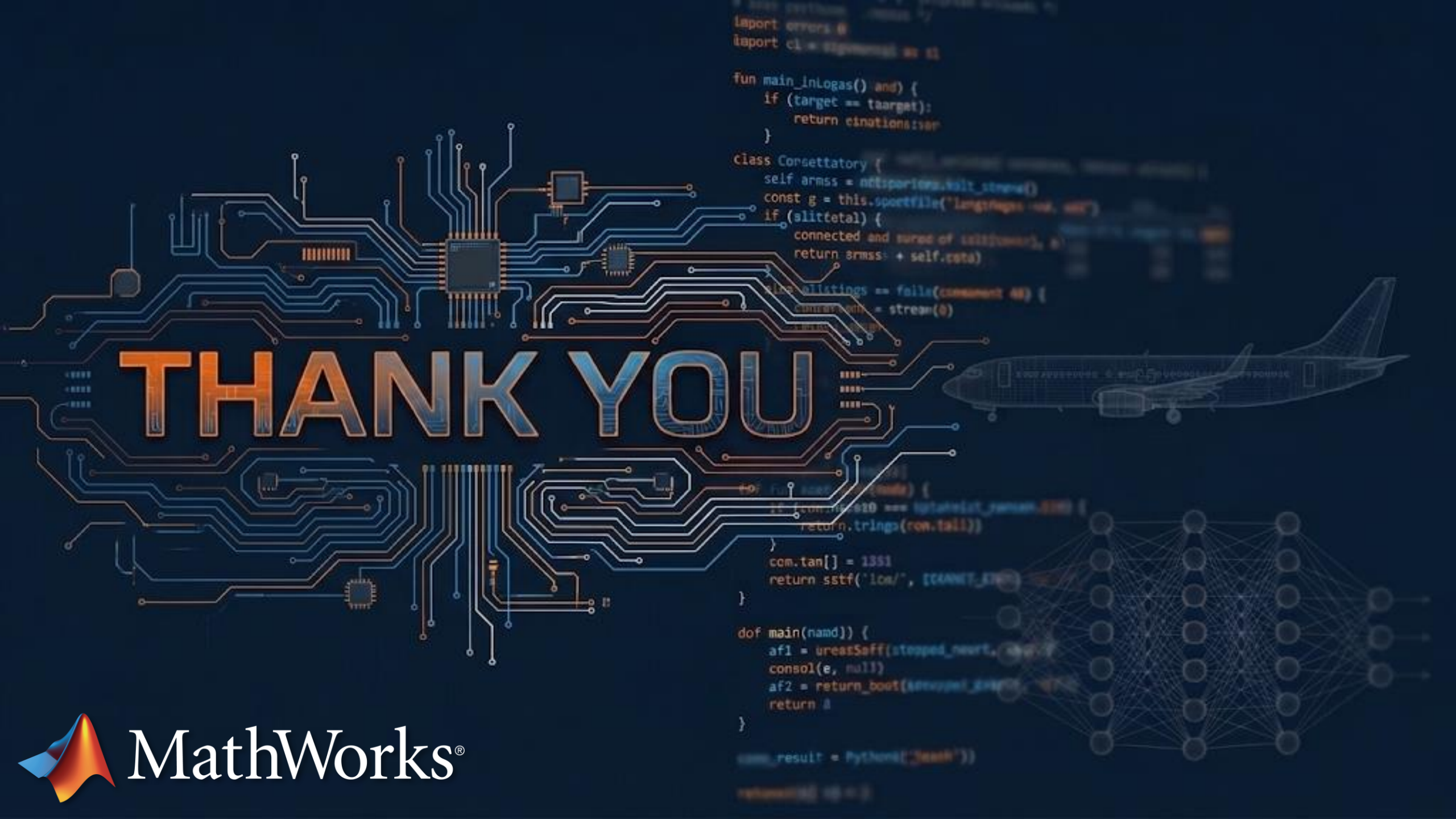
Agentic AI earns trust when it:

- Operates inside a defined engineering method
- Uses proven tools and domain-specific skills
- Keeps humans at approval and decision points
- Produces testable, traceable, reviewable artifacts
- Accelerates exploration without replacing engineering judgment

Automate the workflow. Preserve engineering authority.

Continue exploring: agentic AI for MBSE

- Model-Based Systems Engineering and Agentic AI
  - Augments systems engineers by automating modeling tasks, analyzing system architectures, and supporting informed decisions
- Trade Studies with Agentic-AI-powered MBSE
  - Automatically explores design alternatives, performs trade-off analysis, and supports data-driven engineering decisions
- MBSE with Agentic AI on GitHub
  - The most up-to-date MBSE skills


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