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AI Agents in Engineering

Delegating complex tasks to Multi Agent Systems

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Delegating complex tasks to Multi Agent Systems

Ram Seetharaman

Head of AI

Dr. Moritz Maier

CEO Synera

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Overview

1. Engineering challenges
2. Complex process example: Request for Quote (RFQ)
3. Single agent or Multi Agent System?
4. Building an Multi Agent System for RFQ
5. Summary

Q&A

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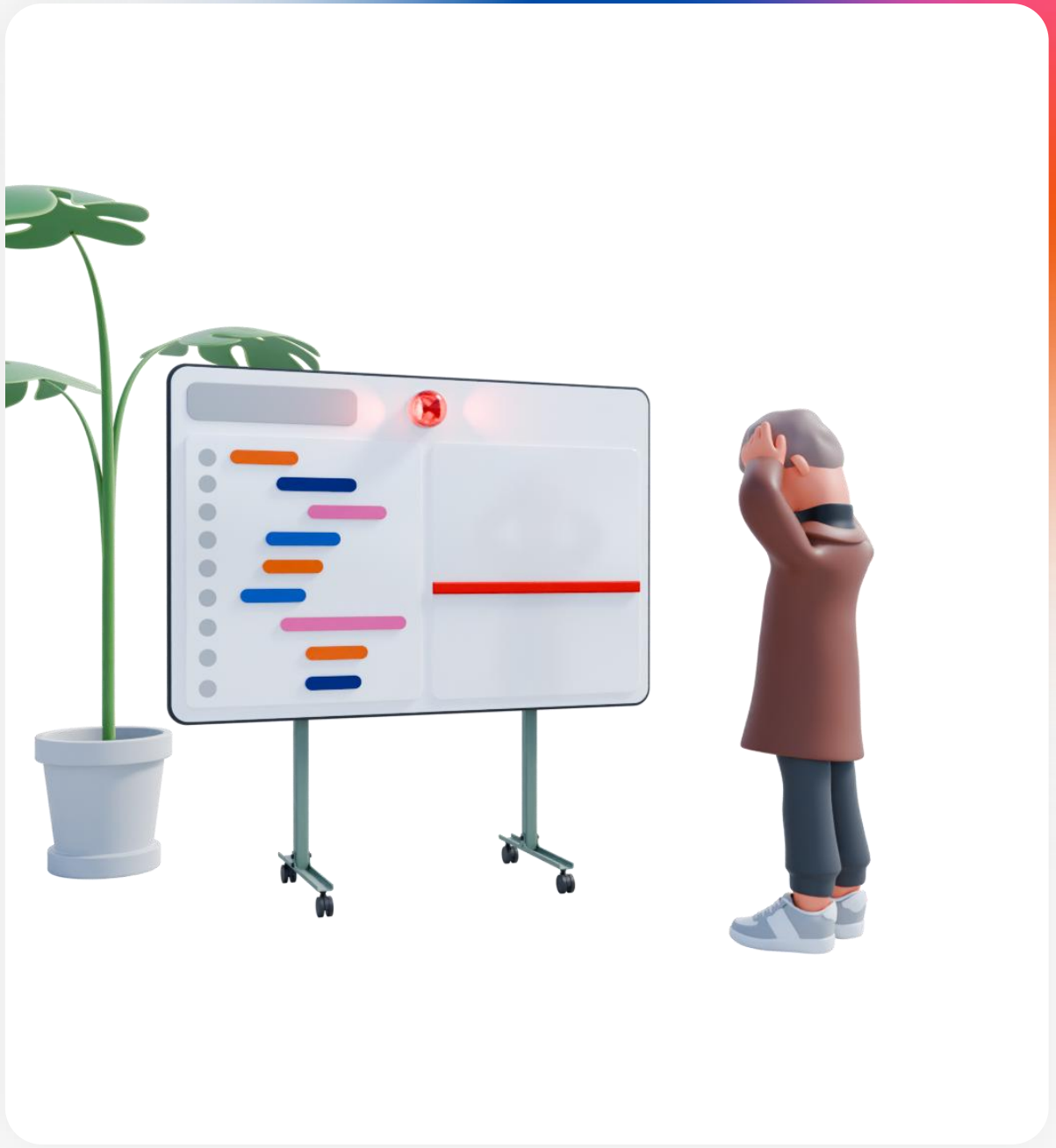
1
Engineering Challenges



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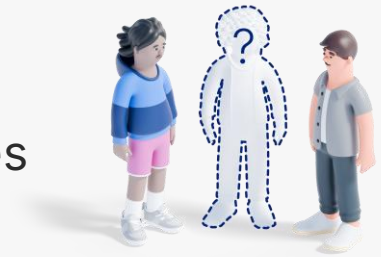
Engineering challenges

Talent shortages



Productivity pressure

Expertise bottlenecks

> **Shortfall of one million engine[illegible] by 2030**
>
> **Engineering Skills Gap**
> Stonehaven 08/2023

Electromobility (e-mobility) | Company, business and industry news (other)

Volkswagen: Why the Group Needs China Speed for E-Cars

Four out of ten cars are sold by the Wolfsburg-based company in China, but lately, the brand has been faltering, even though the market is growing. The Chinese competition is catching up through electrification, is ahead in digitalization, and is developing much faster.

VISION mobility
2023

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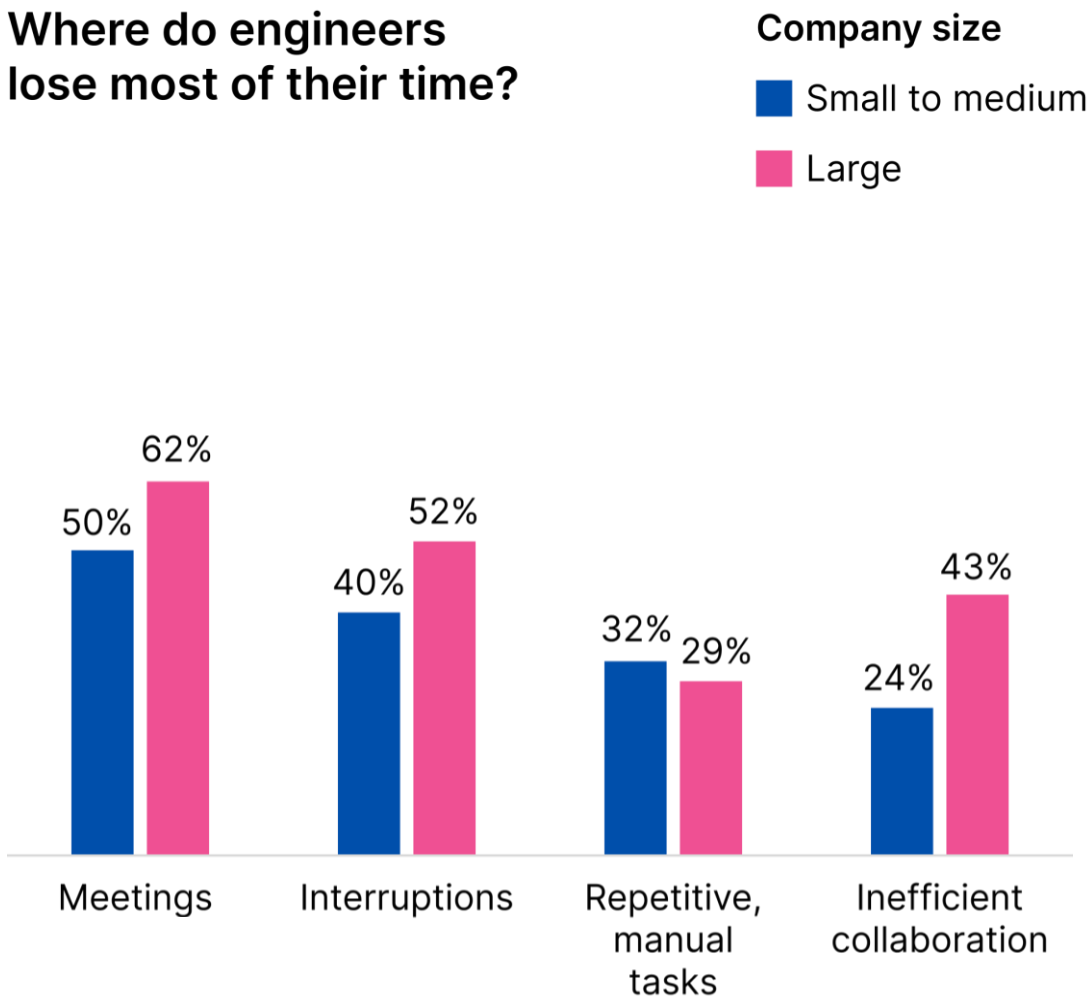
Engineering challenges

- Repetitive tasks and interruptions can be solved by single AI agents

- But what about the more collaborative tasks?



Source: The Business Value of Reducing Engineering Time Wasters, Boucher 2022, Siemens/Tech-Clarity

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Engineering challenges

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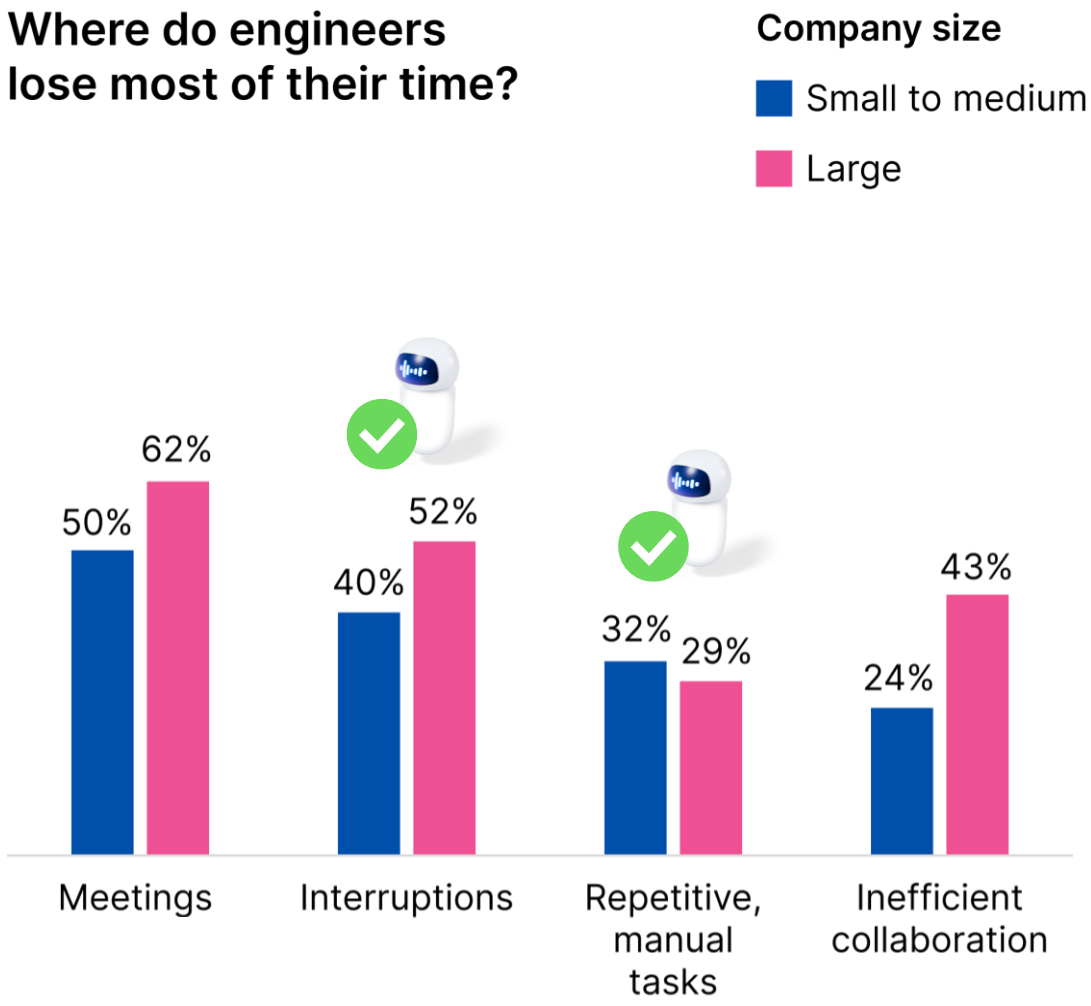

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Engineering challenges

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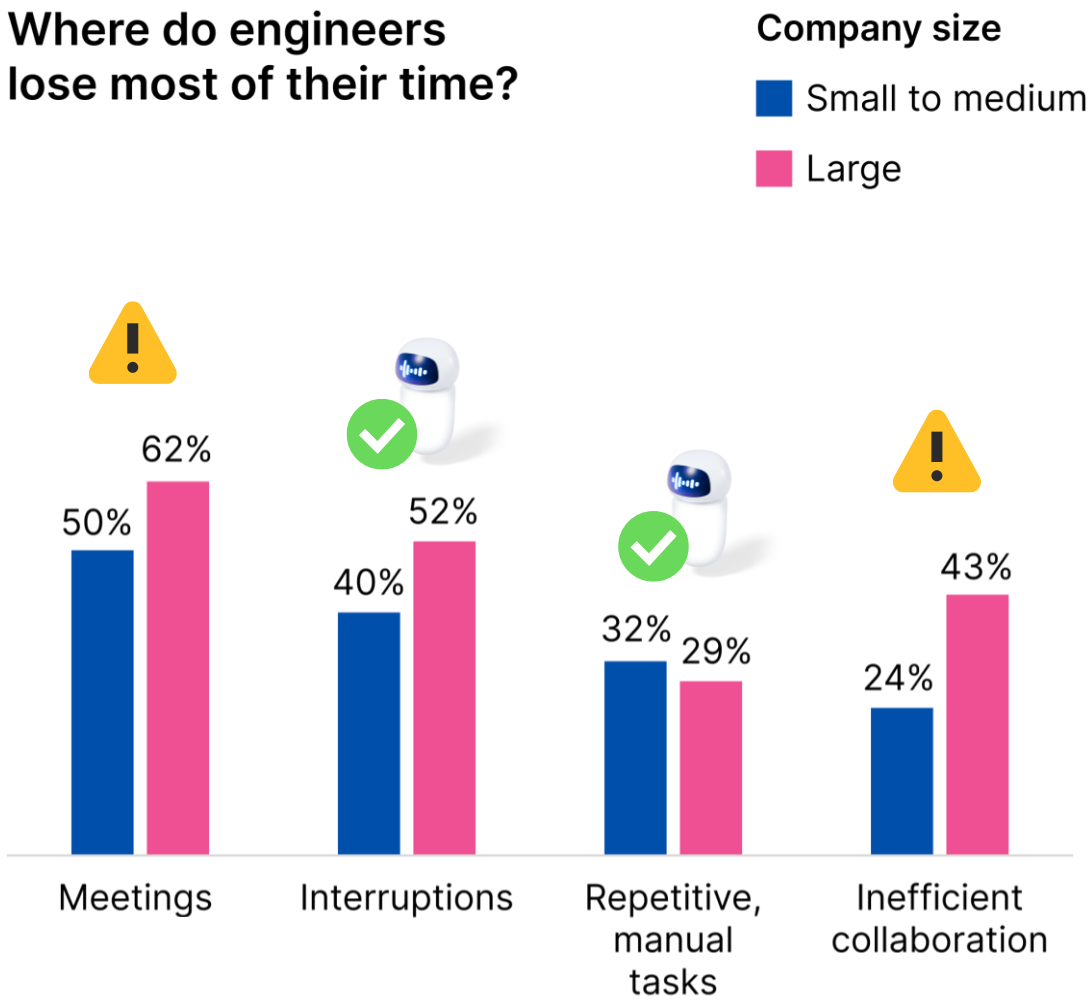

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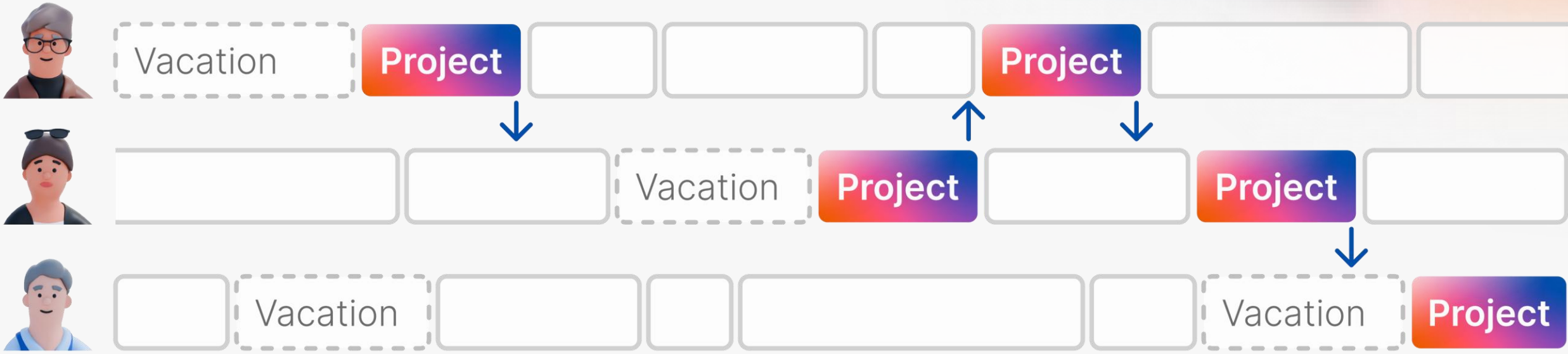
Engineering challenges

- Complex processes require documentation and alignment
- They are often delayed by scheduling problems



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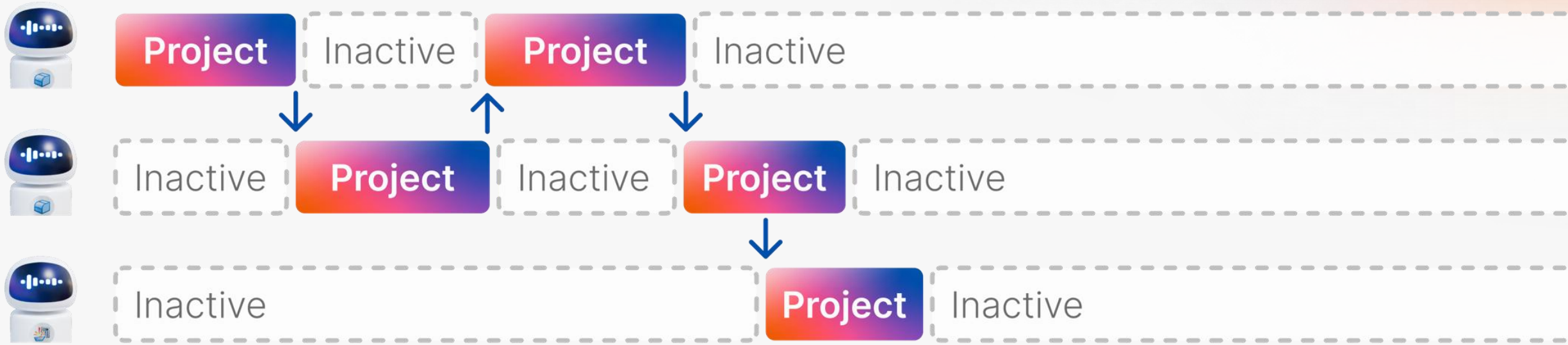
Engineering challenges

- Can agents team up and eliminate these delays?
- Can they create just the necessary documentation?



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Example: Request for Quote

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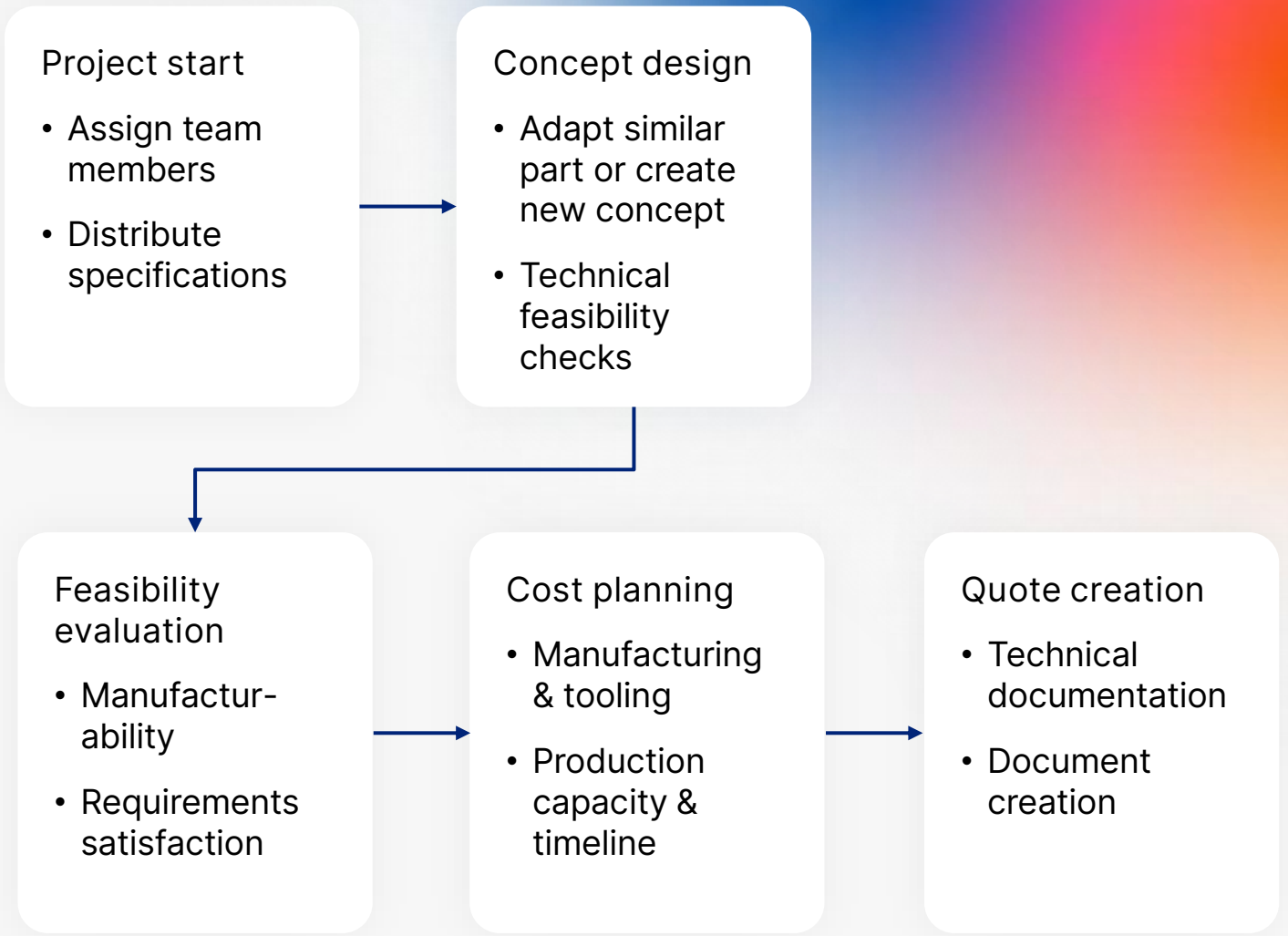
Example: RFQ

- Complex, multi-domain process
- Engineers involved: 4–6
- Target duration: days to weeks
- Possible time savings: up to 50%
- OEMs expect faster responses
- Highly competitive, response time directly impacts win rate



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3

Single agent or Multi Agent System?

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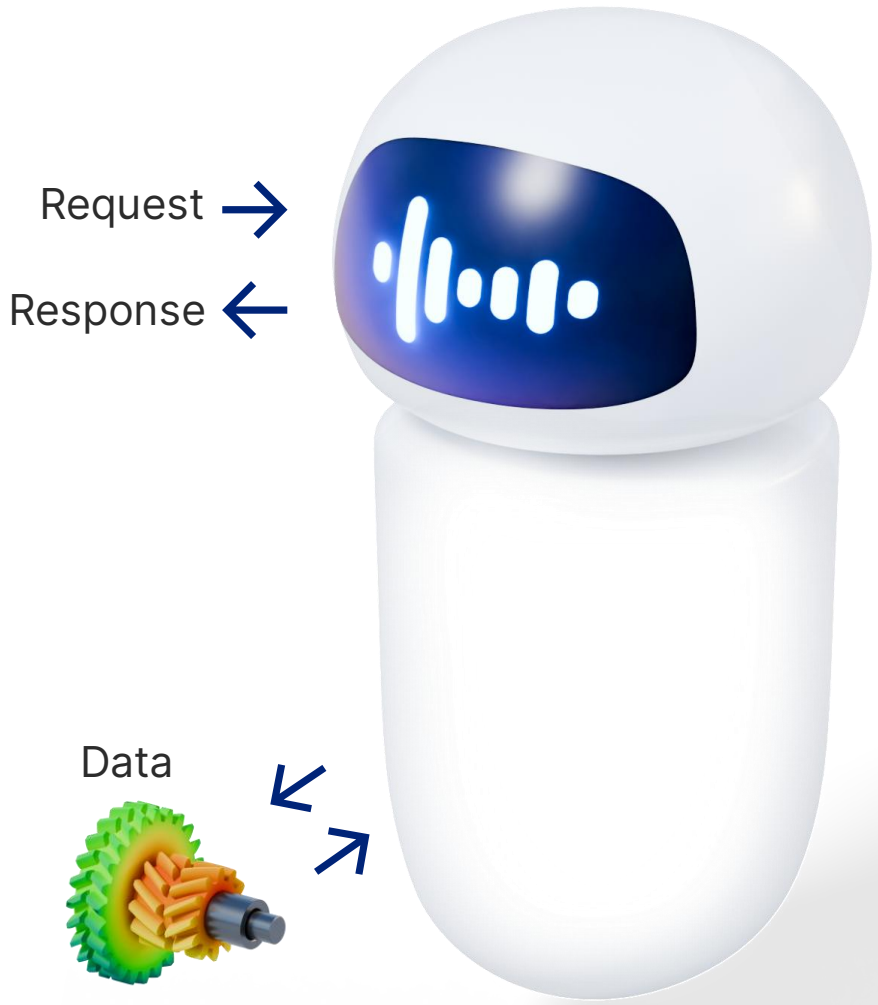
AI Agents

Agents combine two superpowers

- Large language model & memory for communication & reasoning
- Engineering workflows to interact with software like CAD, CAx, Excel, etc.



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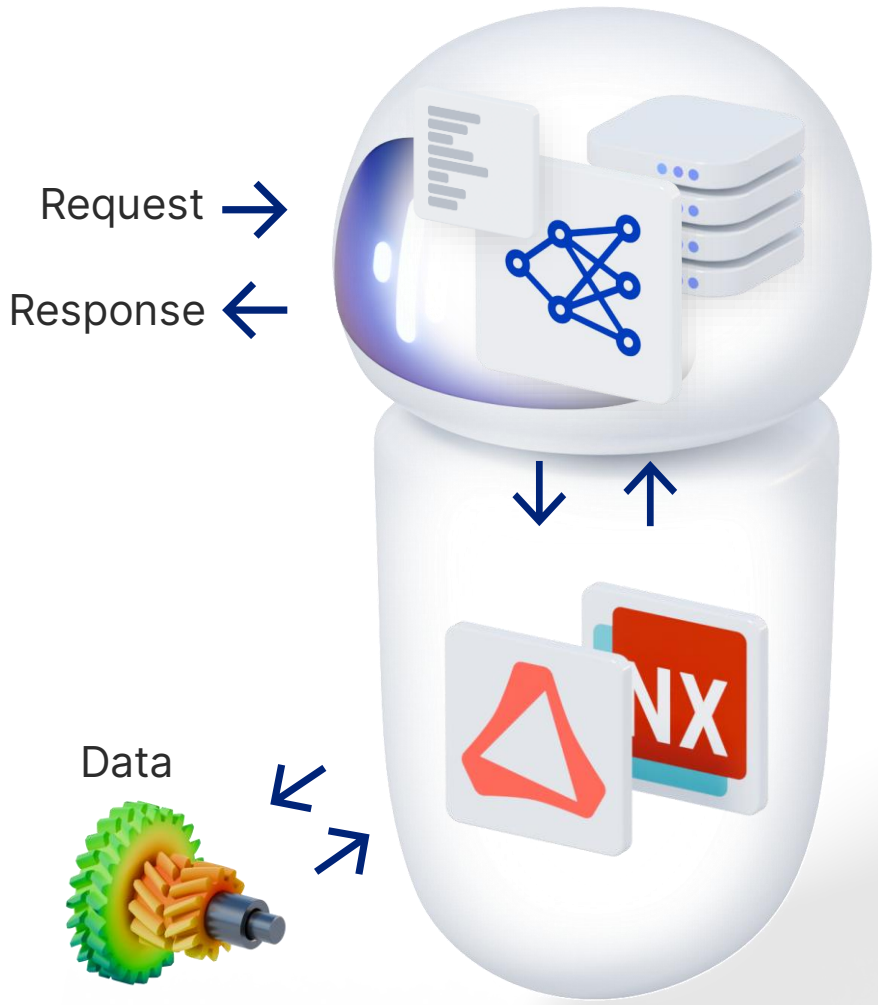

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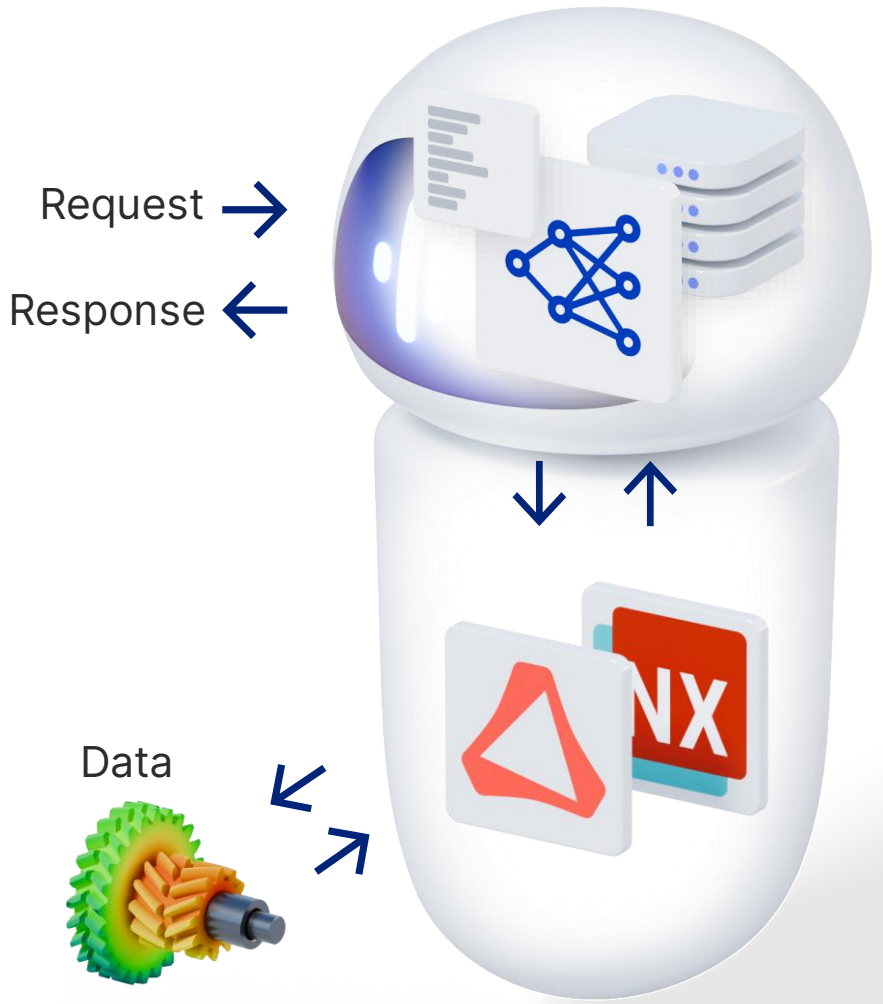

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Agent or Multi Agent System?

- Limited intelligence and model capability
- Focused memory and experience

Great for automating expert-scope, isolated tasks

Fail if task involves multiple domains or too many tools

- Combined intelligence and model capabilities
- Widespread knowledge

Great for automating complex, multi-domain tasks with flexible execution

Every additional agent introduces a randomness factor

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Agent or Multi Agent System?

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⚠️ Every additional agent introduces a randomness factor

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Further reading

McKinsey Quarterly, July 24

Why agents are the next frontier of generative AI

Sreedhar & Chilton, 2024

Simulating Strategic Reasoning: Comparing the Ability of Single LLMs and Multi-Agent Systems to Replicate Human Behavior

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Building a Multi Agent System for RFQ

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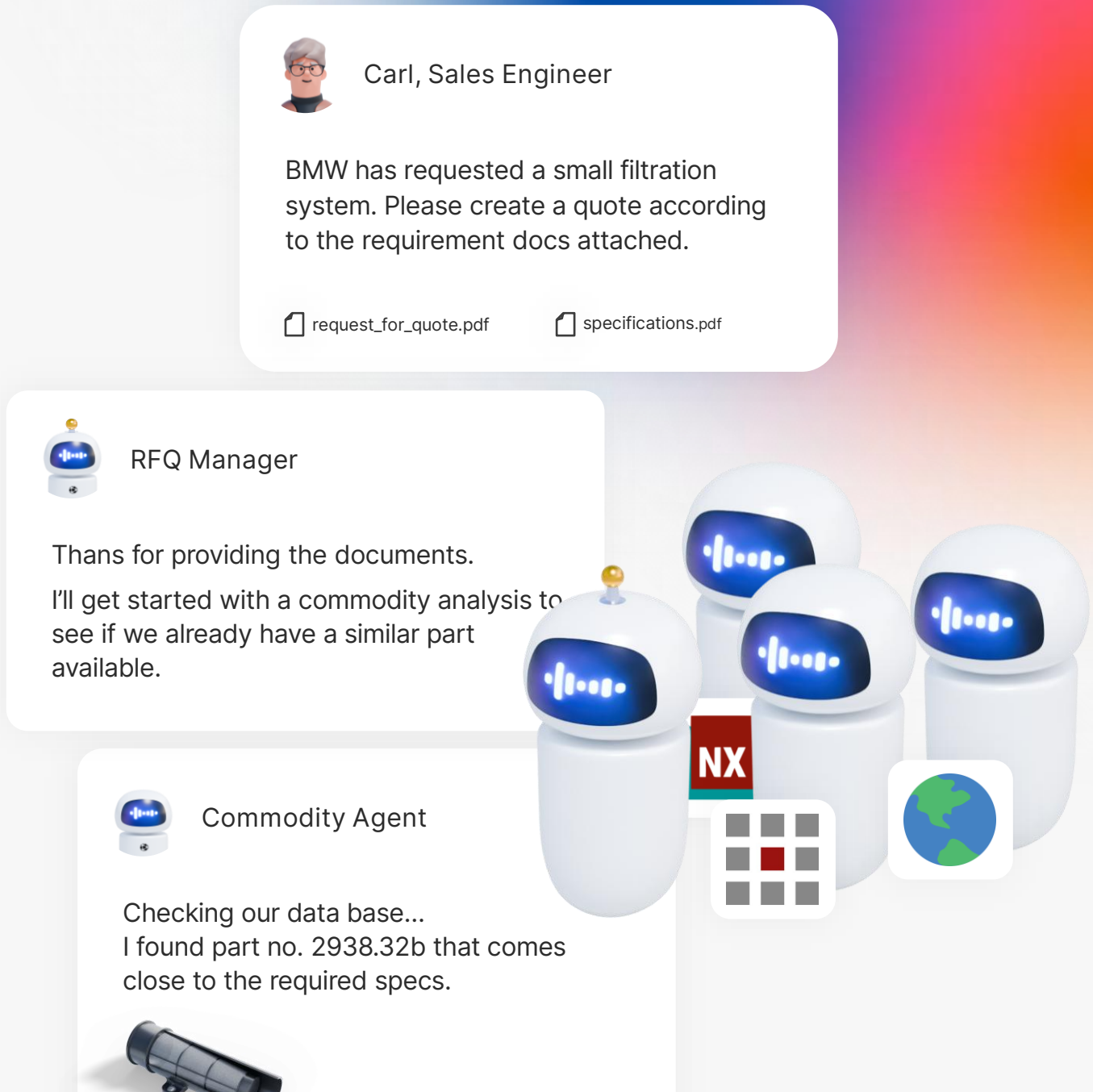
RFQ Multi Agent System

Goal

- Whole RFQ process is completed by agents

Steps

- Process & organigram
- Building agents
- The supervisor
- Connecting the agents



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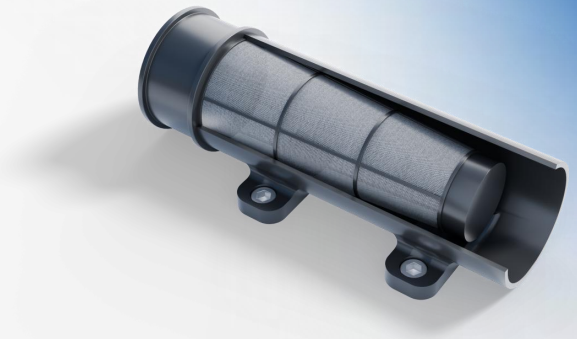
RFQ Multi Agent System



Simplified process for a filtration system

Commodity Analysis

Evaluate best suited commodities for new system

Assembly Planning

Determine best part segmentation and joining method

Purchase Planning

Survey available supply chain options and timelines

Cost Analysis

Calculate manu-facturing and logistics cost

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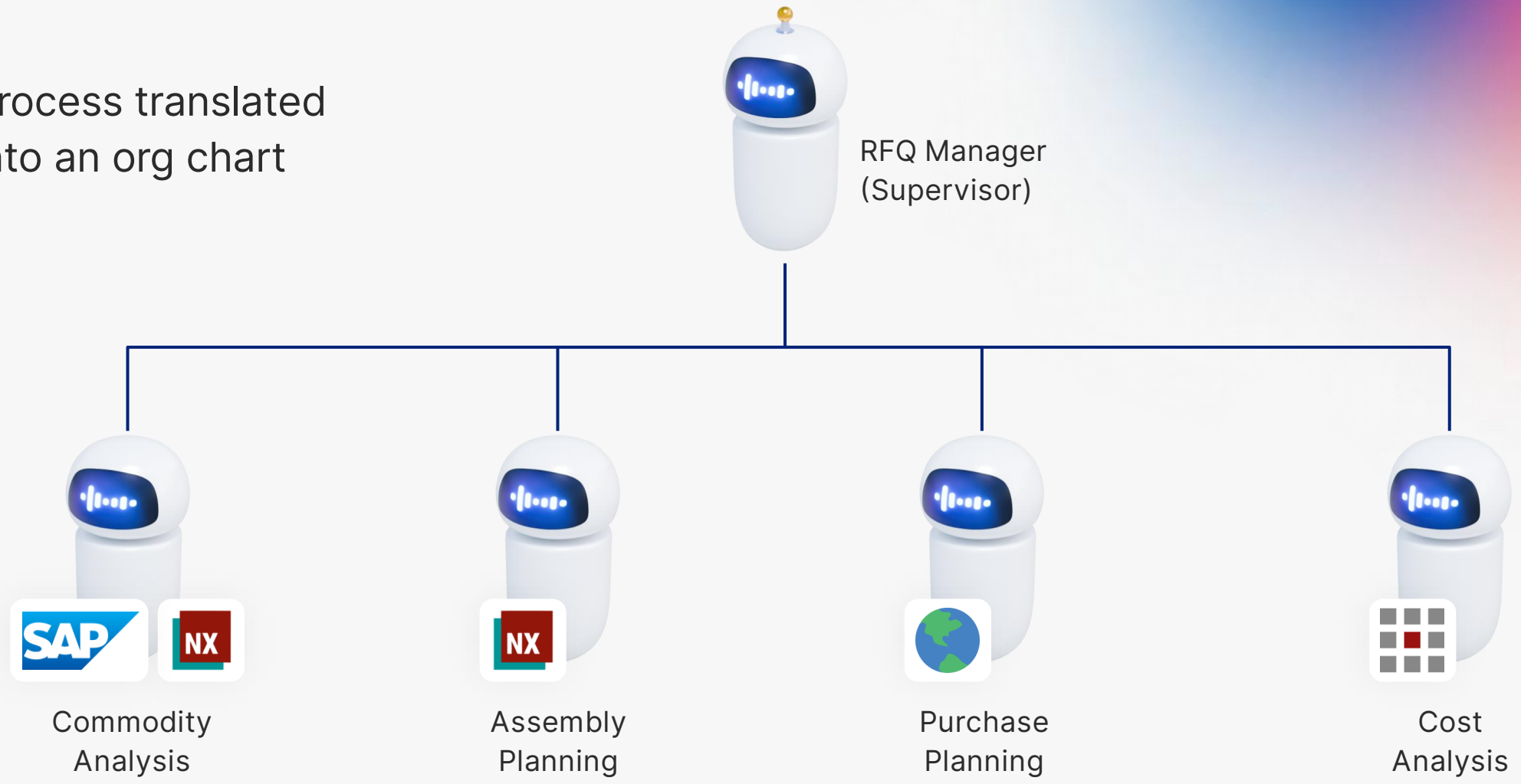
RFQ Multi Agent System

Process translated into an org chart



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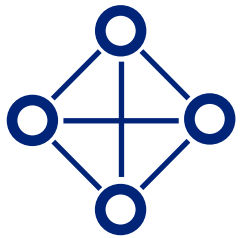
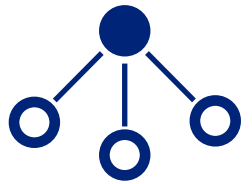
Setting up the structure

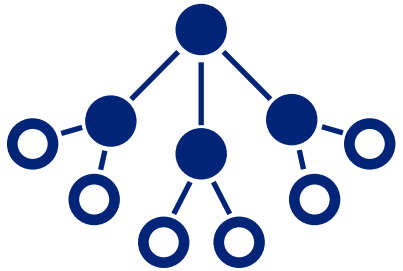
- Agents can theoretically be connected in any structure
- Some structures are more goal oriented than others



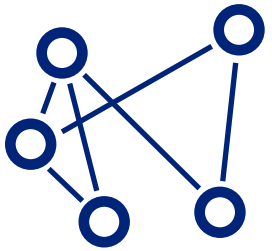
Network



Supervisor



Hierarchical



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The supervisor

- Doesn’t necessarily need workflows to interact with engineering software
- Coordinates the process flow and activates required agents
- Needs to know which agents are present and what their capabilities are
- Forms the point of contact with the human

Synera File Edit Tools Help Search (Ctrl+Shift+F)

New Workflow*

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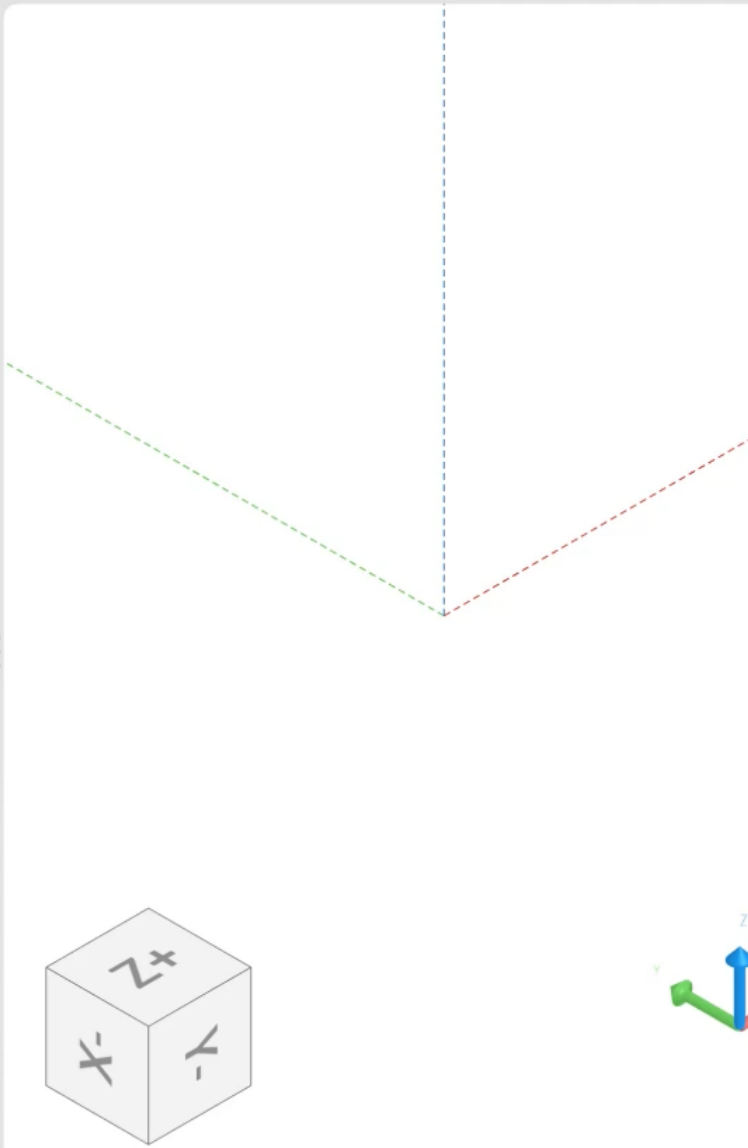

Solution View Zoom 35 Render mode View

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Building the agents

Check out or last webinar on building engineering agents!

Building your first digital engineer

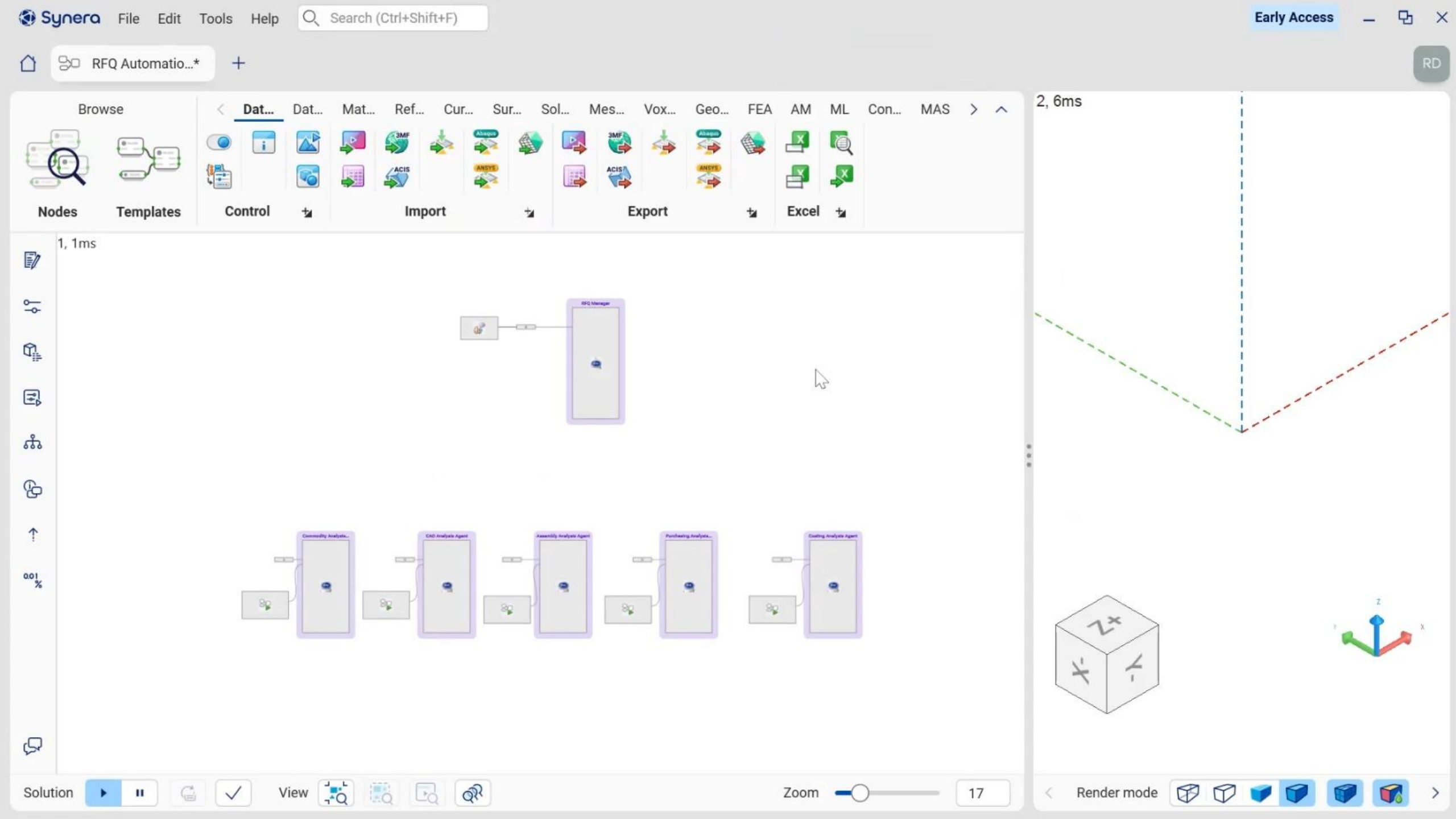
https://www.synera.io/webinar/ai-agents-engineering-building-your-first-digital-engineer

Commodity Analysis

Assembly Planning

Purchase Planning

Cost Analysis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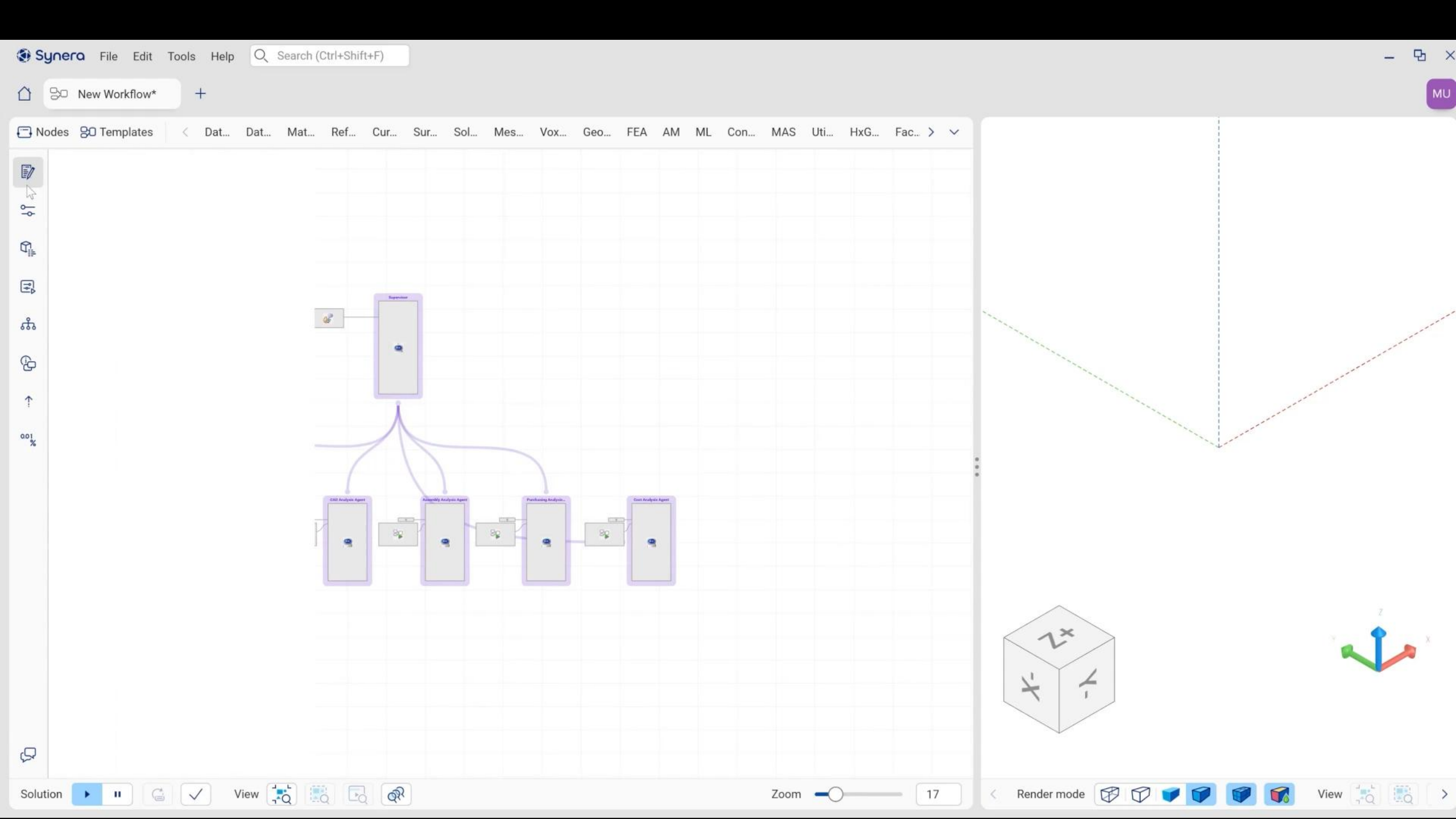
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Assembly Analysis Agent
Purchasing Analysis...
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Y-
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Render mode
View

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5

Business Impact & Summary

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Engineering is about to change

ARTIFICIAL INTELLIGENCE Follow

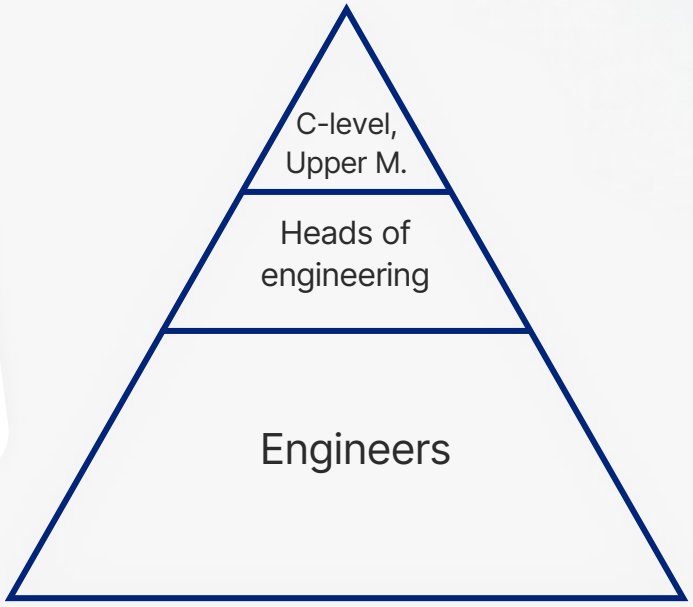
CEOs Start Saying the Quiet Part Out Loud: AI Will Wipe Out Jobs

Ford chief predicts AI will replace 'literally half of all white-collar workers'

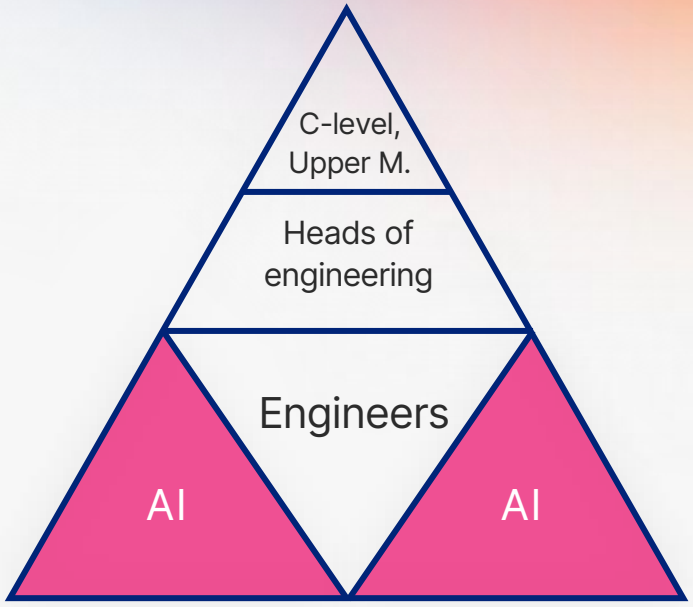
By Chip Cutter Follow and Haley Zimmerman Follow

Wall Street Journal
2025

Organizational chart now



Organizational chart with AI



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Summary

- Identify business critical engineering processes with multiple departments involved
- Design a suitable multi agent system
  - Segment the process into individual agents
  - Connect them via a supervisor agent
- Balance automation by creating tool workflows that break down the complexity of engineering software and make it digestible for an LLM

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Learn more about Synera’s AI Agents for engineering

Building your first digital engineer

https://www.synera.io/webinar/ai-agents-engineering-building-your-first-digital-engineer

Agents as engineering productivity boosters

https://www.synera.io/webinar/ai-agents-in-engineering

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Q&A