



AGENT VS AGENT:

# Automation for Additive Manufacturing

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# What we will cover today

1. The engineering challenge
2. From workflow automation to agentic decision-making
3. Architectures of our proposed agentic solutions
4. Agent vs Agent live demos
5. Agent vs Agent learnings



# The Agent vs Agent Challenge

Automate a typical additive manufacturing (AM) workflow



You work at an AM facility operating multiple metal printers.



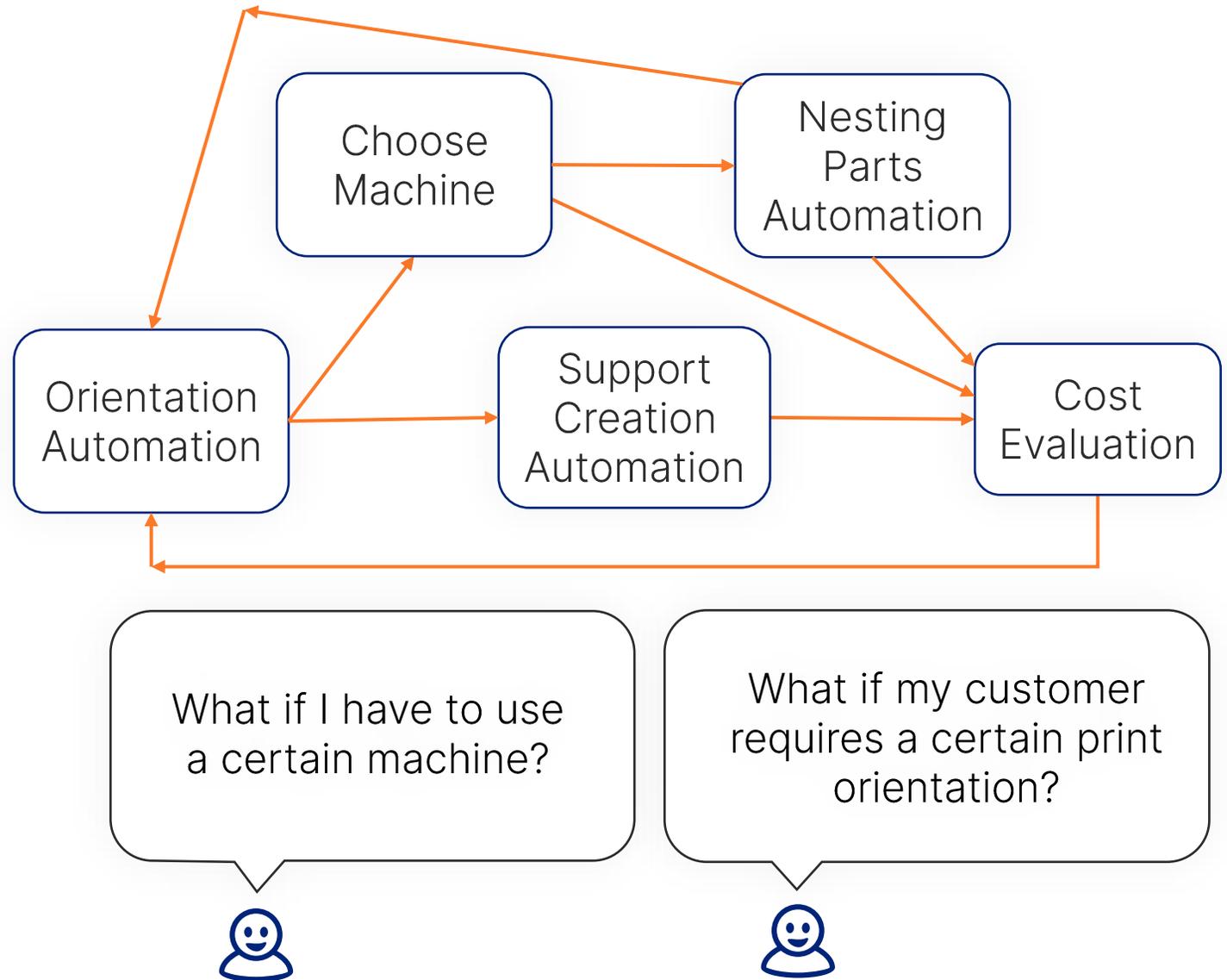
Customer orders arrive daily and must be prepared for production.



Determine the optimal manufacturing approach within cost and delivery constraints.

# What About Rule-Based Workflow Automation?

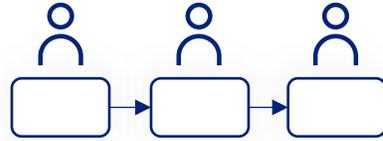
- Effective for automating deterministic AM workflows
- Complexity grows as we add rules
- Still need something for evaluating trade-offs of constraints



# Automation Types

**Scope**

## Rule-based



A workflows that executed predefined, rule-based tasks automatically.

**Tasks**

Deterministic & pre-defined

**Strengths**

Fast, easy to build

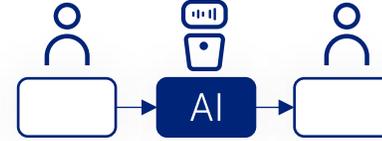
**Weaknesses**

Limited to tasks explicitly programmed

**Example**

Import CATIA, mesh the part with 5mm element size and run a linear FEA.

## AI-enhanced



A workflow that calls an AI model for one or more pre-defined and specific tasks

Deterministic, requiring some flexibility

Handling complex rules

Output of AI must be processable downstream

Predict the stress distribution based on historic results.

## Agentic



A system designed to perform complex tasks autonomously

Intelligent, adaptive

Human-like behavior

Inefficient for deterministic automation

Gather all required inputs, analyze supplier responses, and draft an RFQ response.

# From Engineering as Usual to Agentic Engineering Systems



**1** Digitize engineering processes step-by-step as **workflows**

**2** Connect your CAX tools to workflows, creating a digital thread



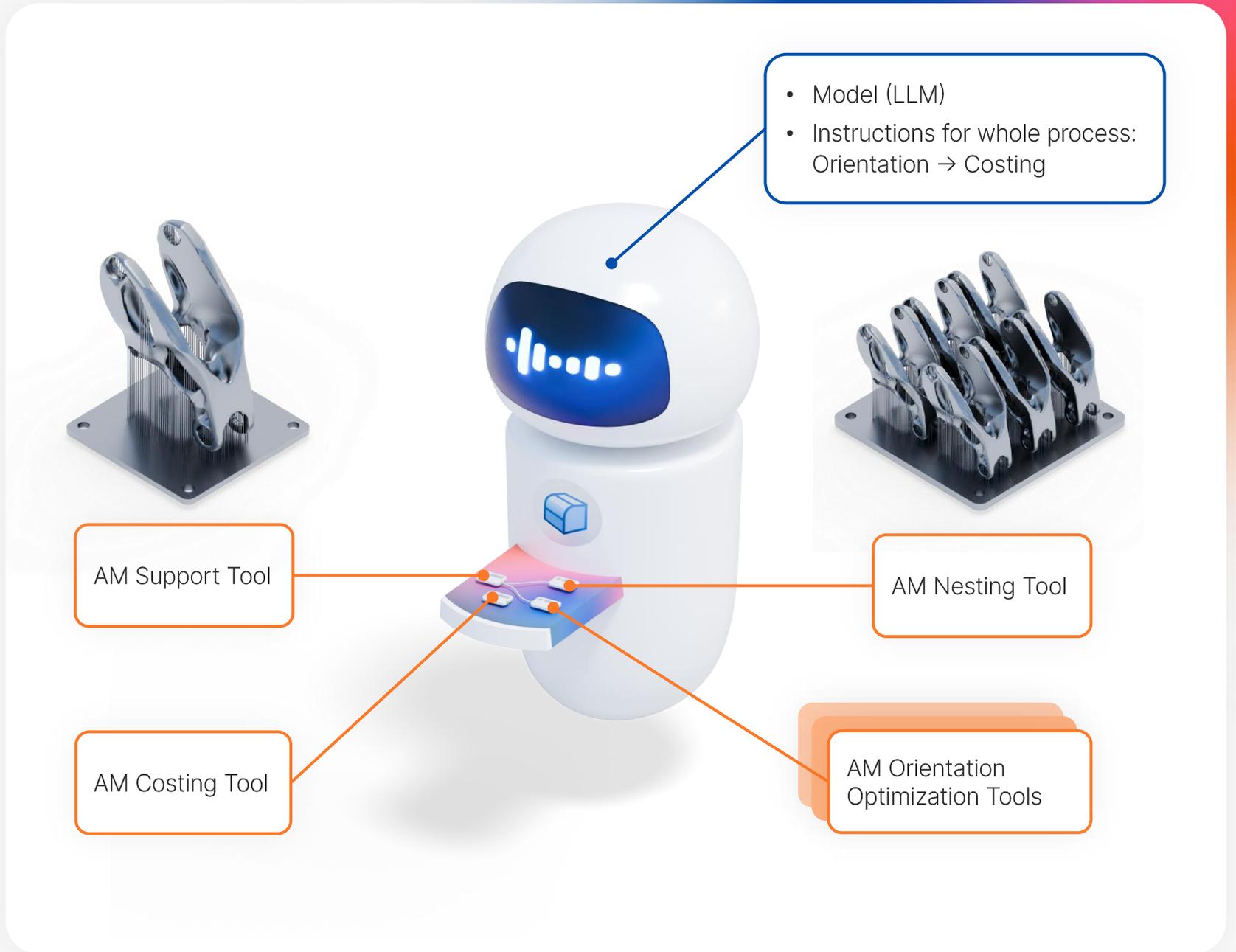
**4** Deploy **AI agents** to access and control engineering tools autonomously

**3** Publish workflows as callable tools for other engineers and agents to use



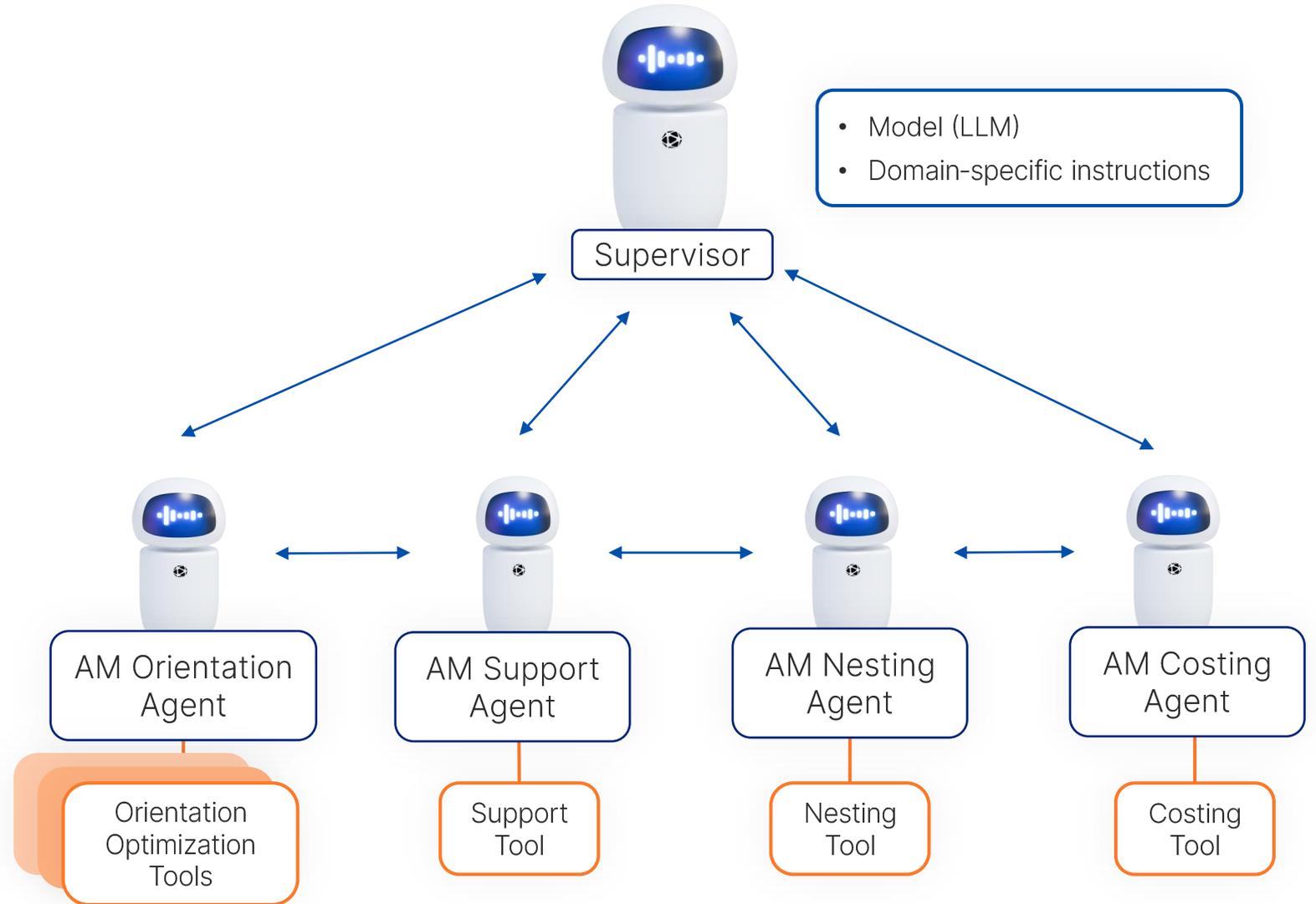
# Single Agent Architecture

- Easy to set-up
- One agent for the whole process
- No agent-to-agent communication overhead



# Team of Agents Architecture

- Simple prompt
- One expert agent for each process
- Less complicated decisions for the supervisor



# Single Agent vs Team of Agents

## Single Agent

### Pros:

- Lower latency (fewer handoffs)
- Simple architecture
- Centralized reasoning

### Cons:

- Context can get too complicated
- Complex prompting



## Team of Agents

### Pros:

- Specialized expertise per agent
- Great for evaluations with lots of context
- Simpler prompting

### Cons:

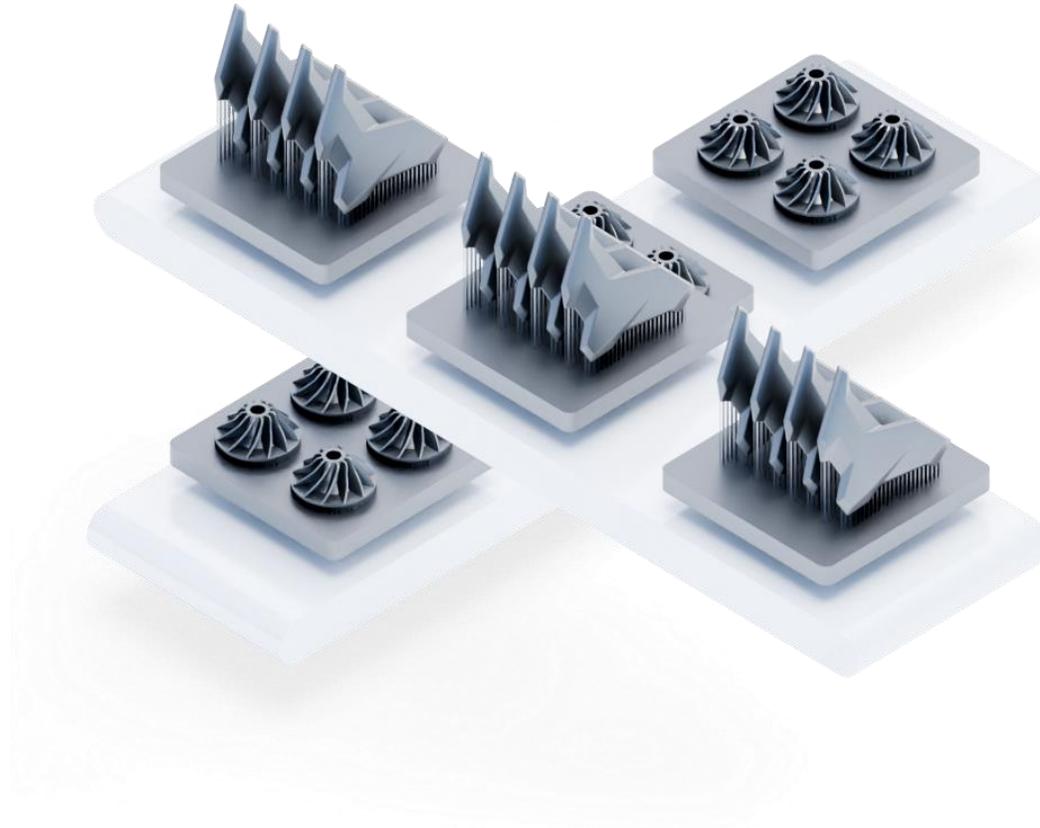
- More overhead to define agent roles
- More upfront work creating architecture



Optimal architecture can depend on LLM choice

# Closing Remarks

- Workflows guide execution. Agents decide.
- Architecture matters as complexity grows.
- Single-agent systems are powerful but less specialized.
- Teams of agents sharpen expertise and decision-making.





**Thank you**