Agentic AI

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AI has evolved in both capabilities and autonomy

Full human control

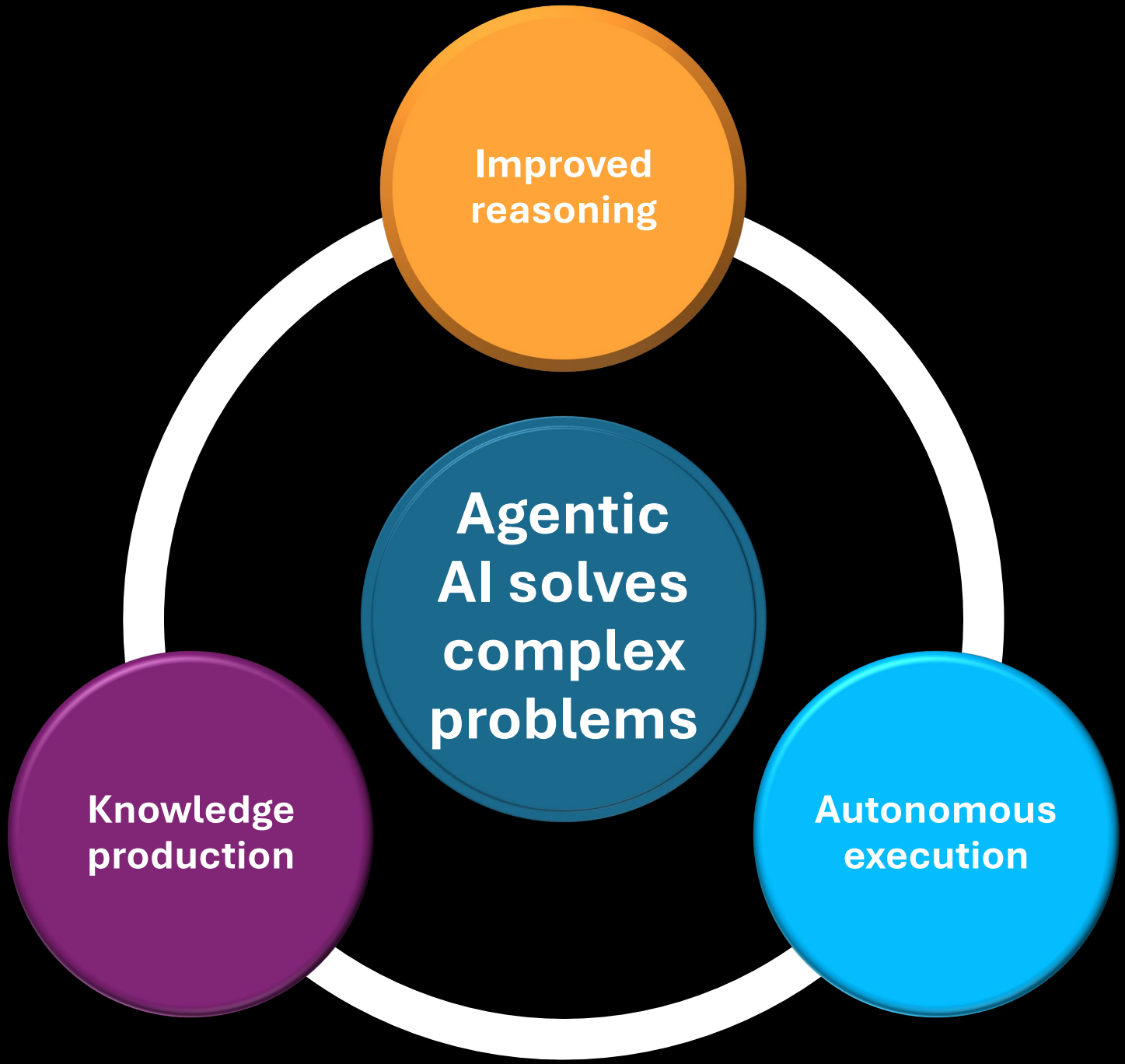
Human-in-the-loop

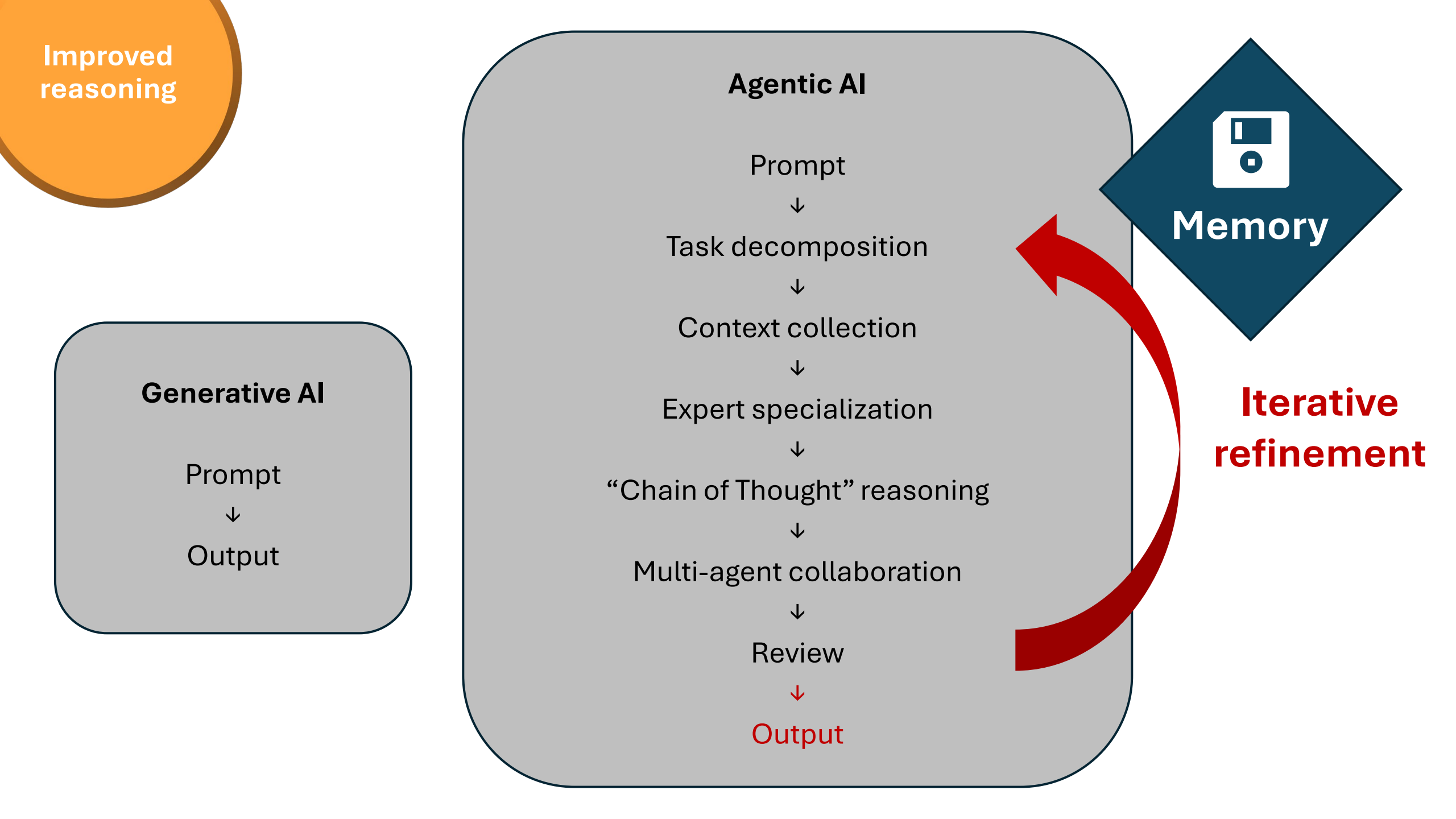
Full autonomy

"Dumb" AI	Predictive AI	Generative AI	Agentic AI
Hard-coded automation	Pattern recognition Outcome prediction	Knowledge overview Content generation	Complex reasoning Task execution

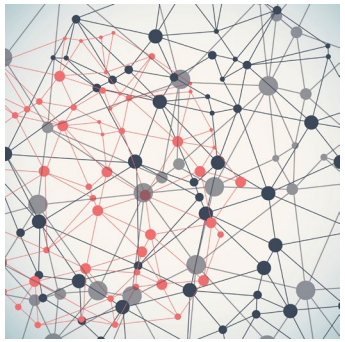
Simple tasks

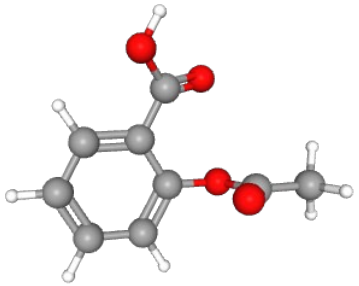
Complex tasks


Improved reasoning
Agentic AI solves complex problems
Knowledge production
Autonomous execution


Improved reasoning
Generative AI
Prompt
↓
Output
Agentic AI
Prompt
↓
Task decomposition
↓
Context collection
↓
Expert specialization
↓
“Chain of Thought” reasoning
↓
Multi-agent collaboration
↓
Review
↓
Output
Memory
Iterative refinement

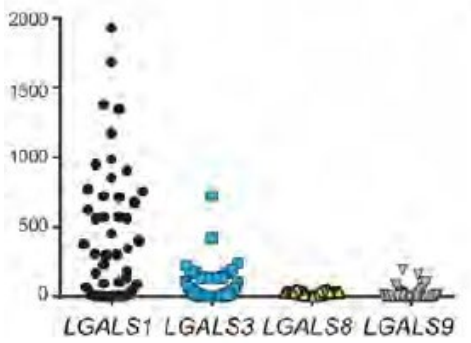
Knowledge production

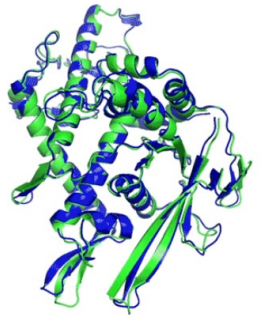




Tool use

- Human input
- Web search
- Calculations
- Model predictions
- Simulations
- Data analysis
- Database query





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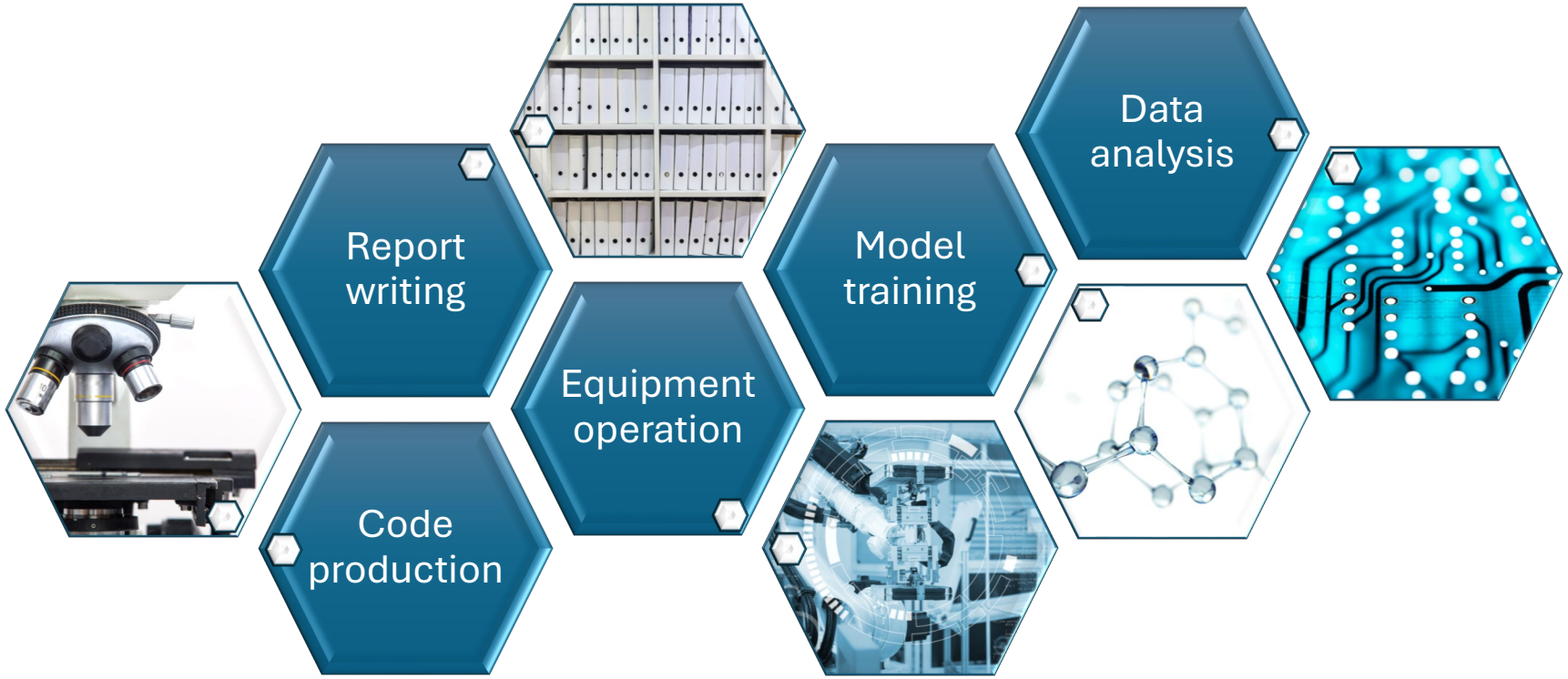
Autonomous execution



→ **Execution of complex and long-running processes with minimal human input**

Reasoning &
Execution

Data &
Knowledge
Reasoning &
Execution
Skills &
Tools

Gemini

Upgrade to Google AI Plus

S

New Gem

Save

Describe your Gem and explain what it does

Instructions

Example: You are a horticulturist with a background in natural lawns and native plants, and you help people plan gardens. Take into account location, weather, and what plants are

Default tool

No default tool

Knowledge

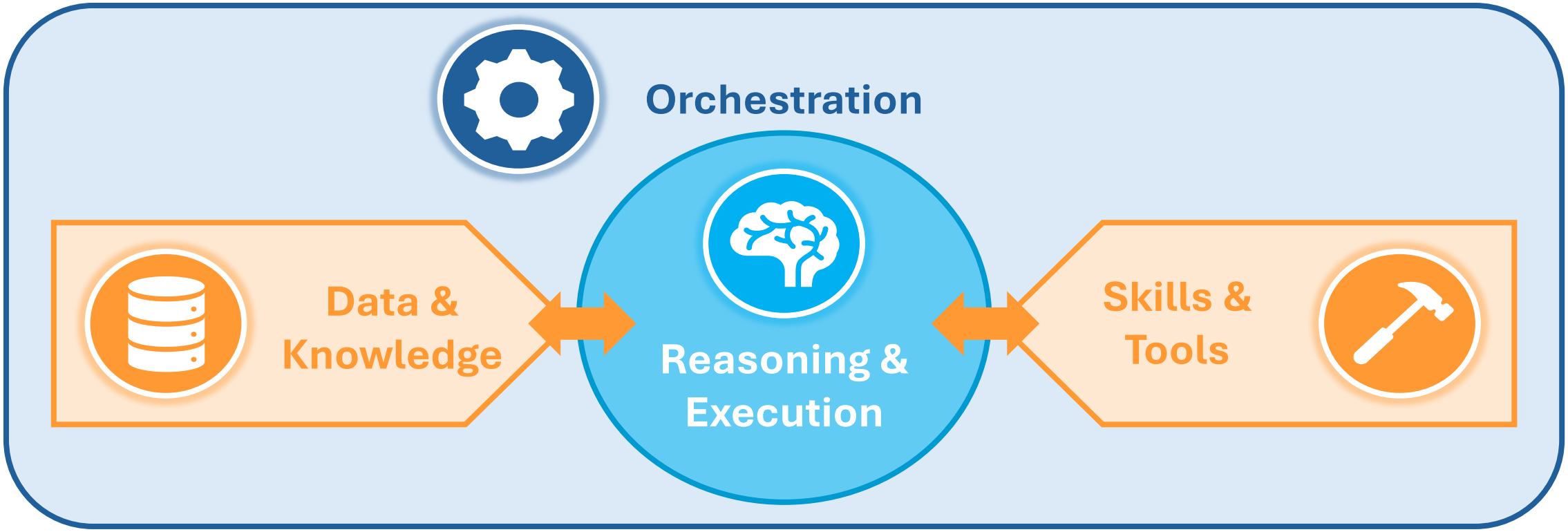
Add files for your Gem to reference

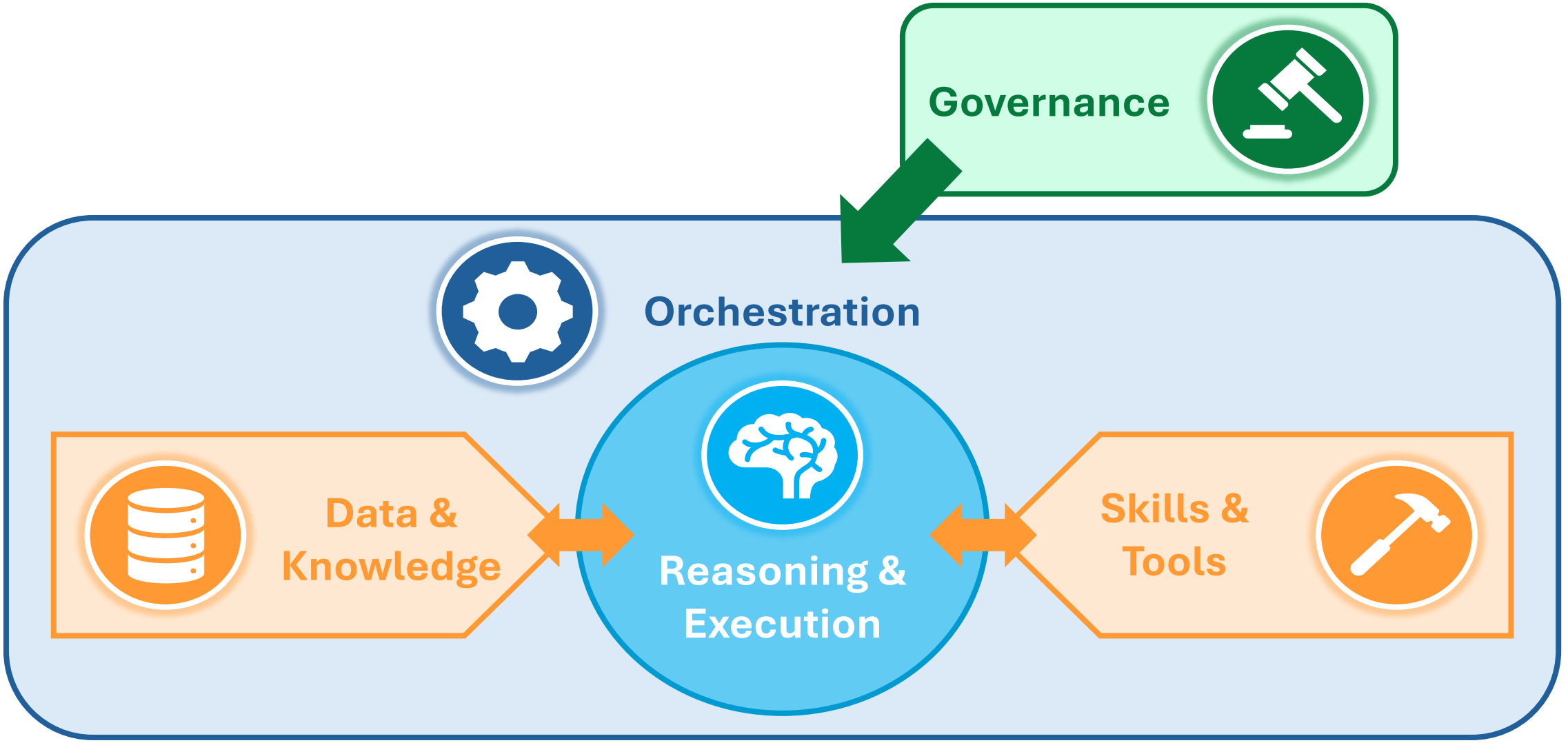
Preview

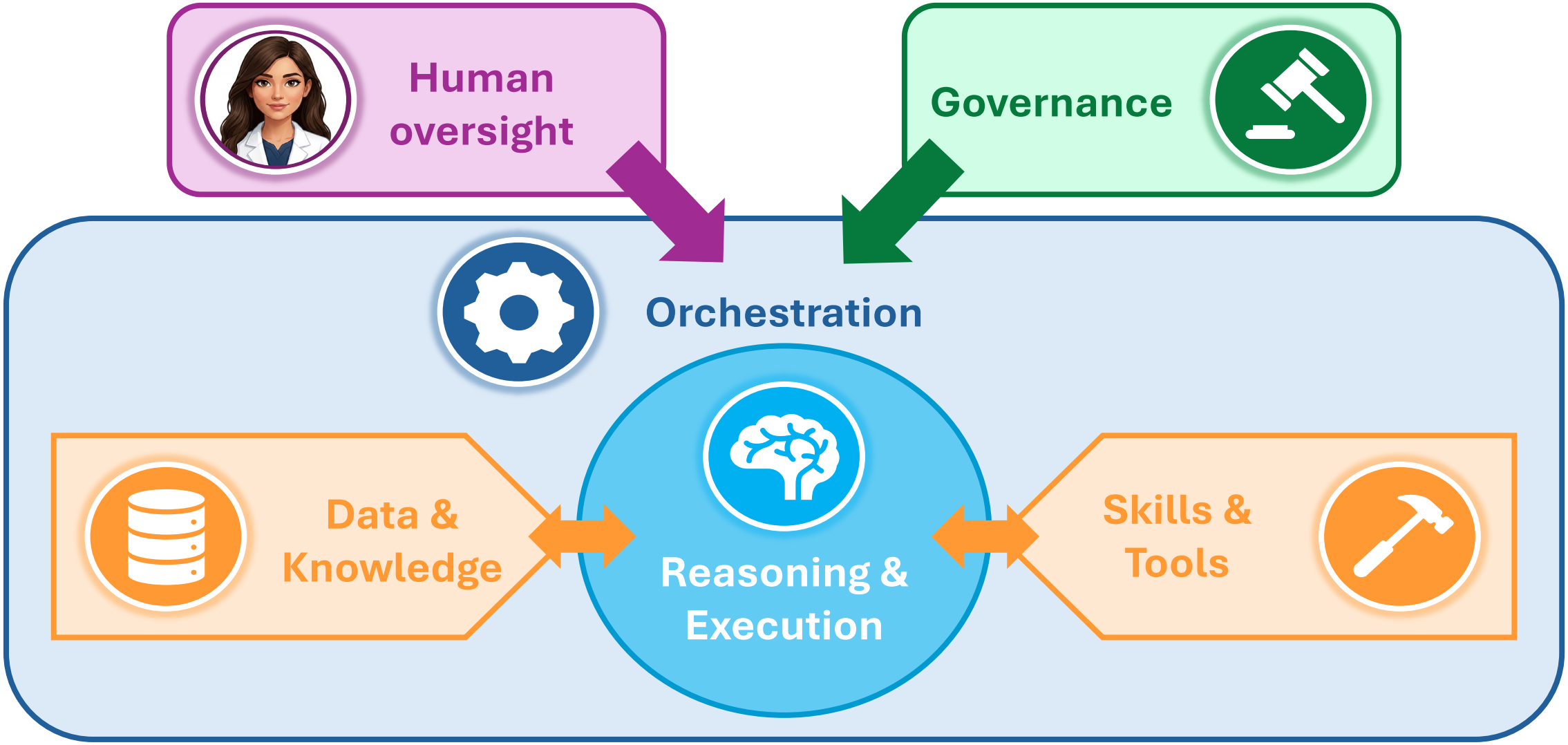
To preview your Gem start by giving it a name

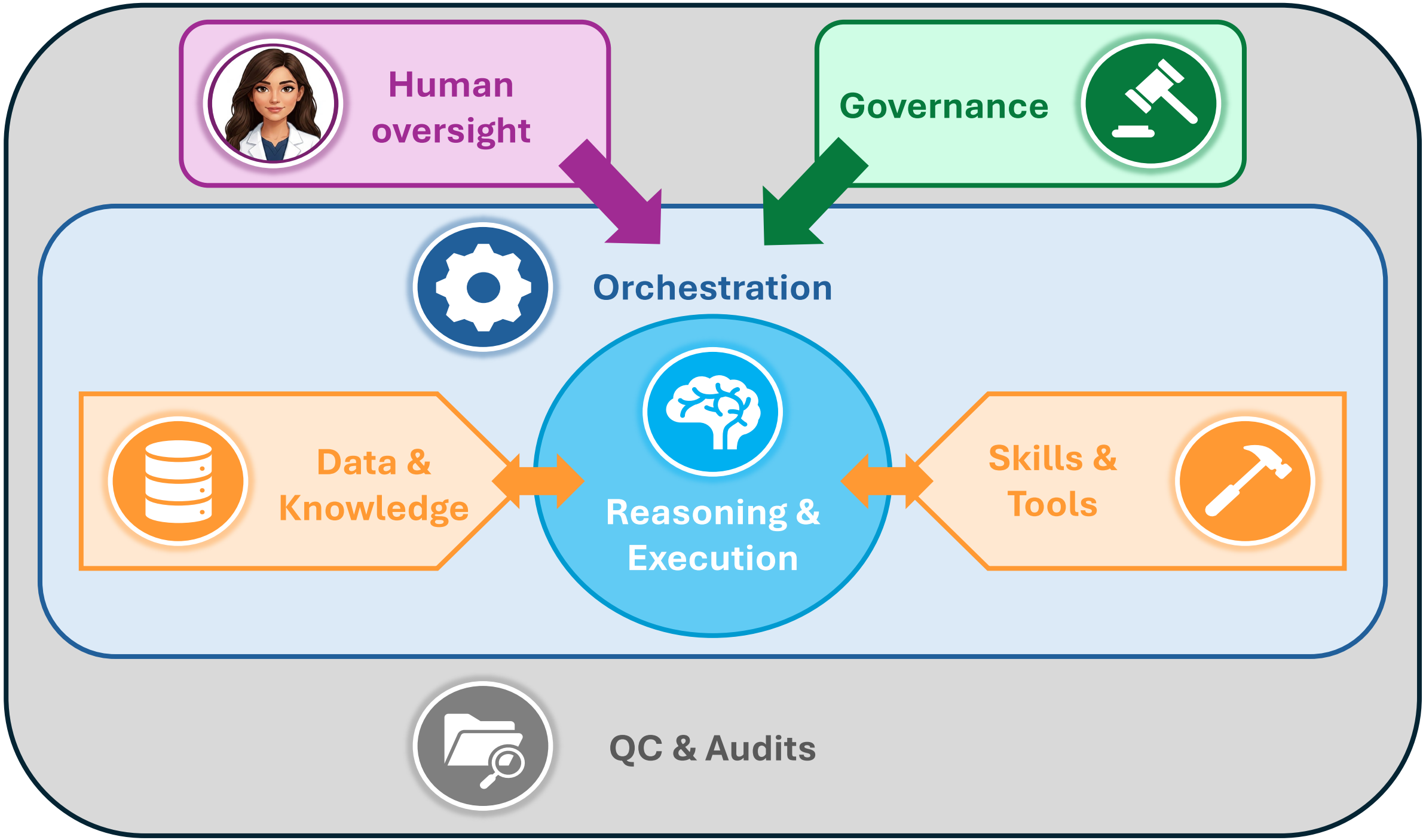
Ask Gemini

Fast


Orchestration
Data &
Knowledge
Reasoning &
Execution
Skills &
Tools


Governance
Orchestration
Data &
Knowledge
Reasoning &
Execution
Skills &
Tools


Human oversight
Governance
Orchestration
Data & Knowledge
Reasoning & Execution
Skills & Tools


Human oversight
Governance
Orchestration
Data & Knowledge
Reasoning & Execution
Skills & Tools
QC & Audits

Orchestration provides multi-agent coordination and operational control

- Coordinates agents, skills, tools and infrastructure
- Manages workflows
- Maintains persistent state and memory
- Handles failures, retries and recovery
- Implements human oversight
- Enforces governance guardrails

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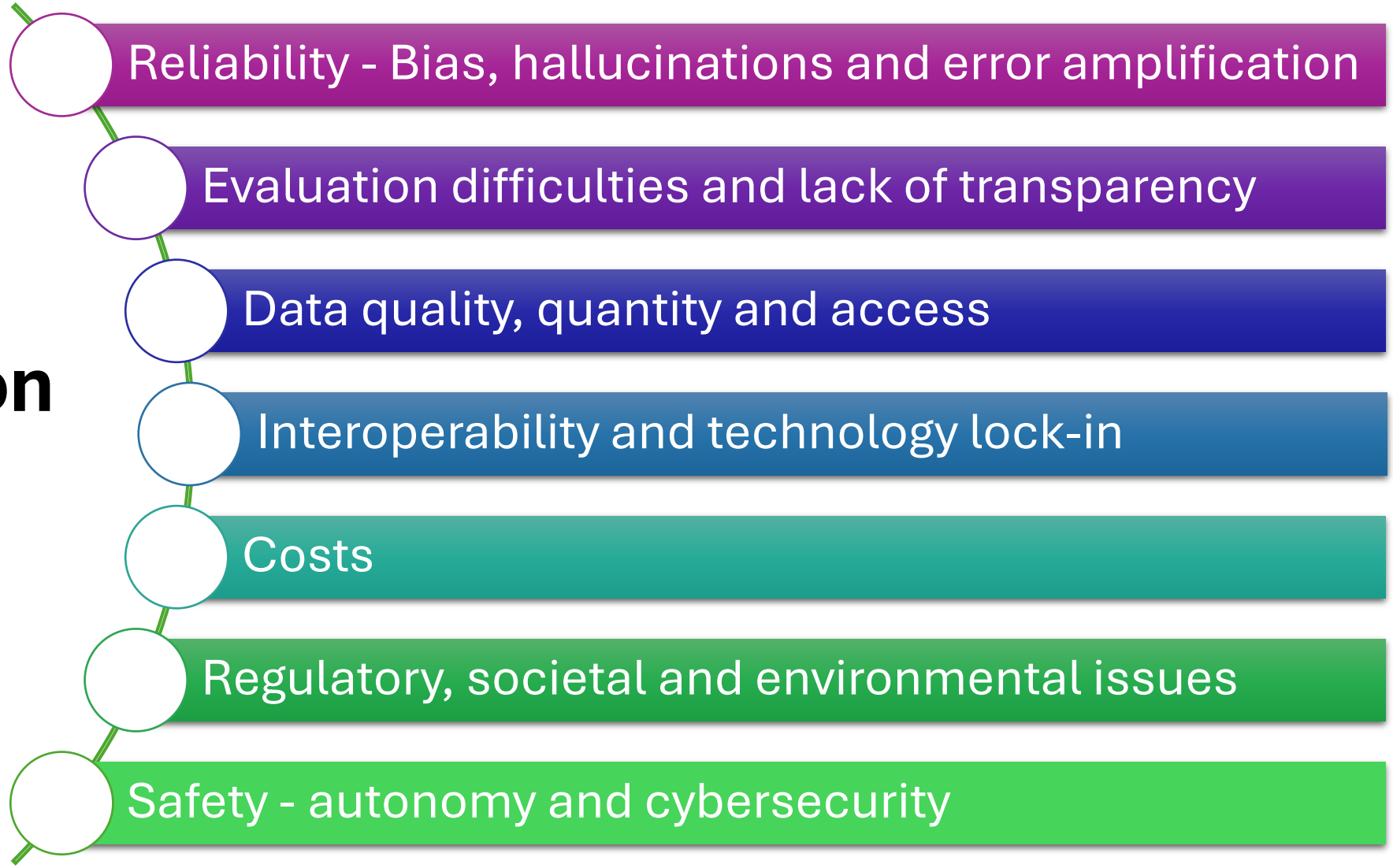
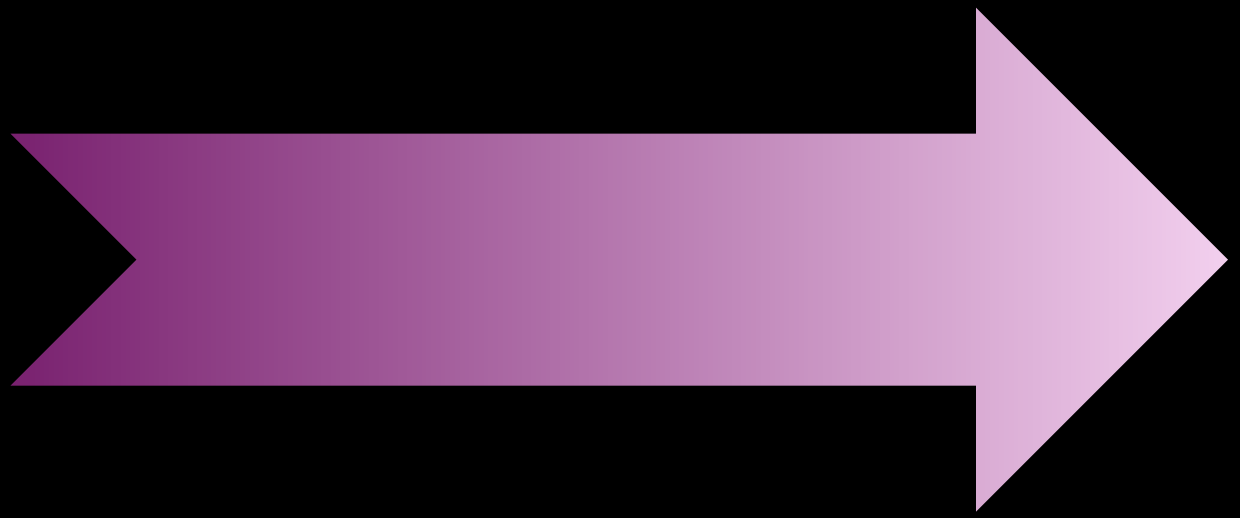
Agentic AI is a general-purpose technology

Intelligence gathering	Systems biology	Lab automation	Drug discovery	Clinical development	Approval/ Surveillance	Clinical practice
Literature review Database query Knowledge integration Patent review Competitive intelligence	Knowledge graph production Multi-omics integration Pathway analysis Biomarker discovery	Protocol generation Instrument operation Quality control Autonomous experiments Automatic documentation	Molecule generation Target/MoA identification SAR analysis Lead optimization ADMET prediction	Trial design Site selection/ orchestration Patient identification Patient monitoring Personalized engagement	Monitoring of regulatory requirements Compliance verification Document drafting Adverse event monitoring	Personalized prevention/ treatment Patient monitoring Diagnostic tools Treatment planning
Business operations						
Recruitment, Staff management, Supply chain operation, Infrastructure surveillance, ESG monitoring, financial reporting						

Agentic AI implementation faces many challenges



AI as a
TOOL



AI as a
COLLEAGUE

Take home message

- AI is moving towards complex agentic systems with increasing autonomy
- Tool use provides a major boost to AI capabilities
- Robust orchestration is a key success factor
- Discriminative and generative AI remain important as building blocks in agentic AI systems and freestanding tools