



# From Generative to Agentic: Transforming Grid Planning and Operations

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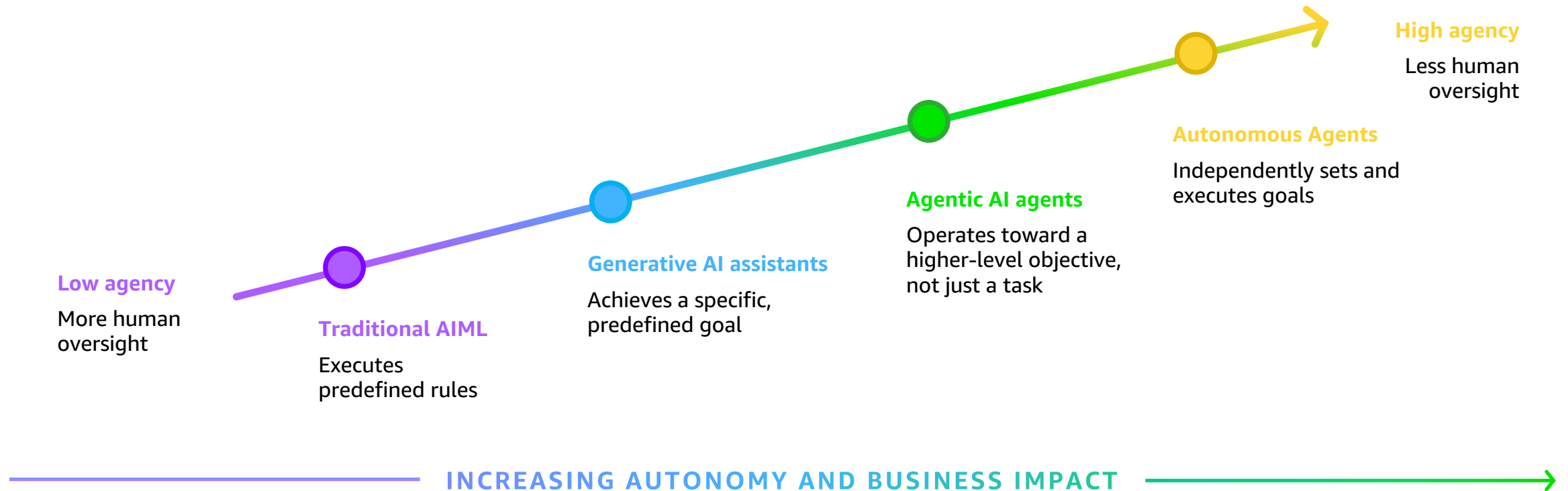


# Agentic AI will simplify complex operational processes

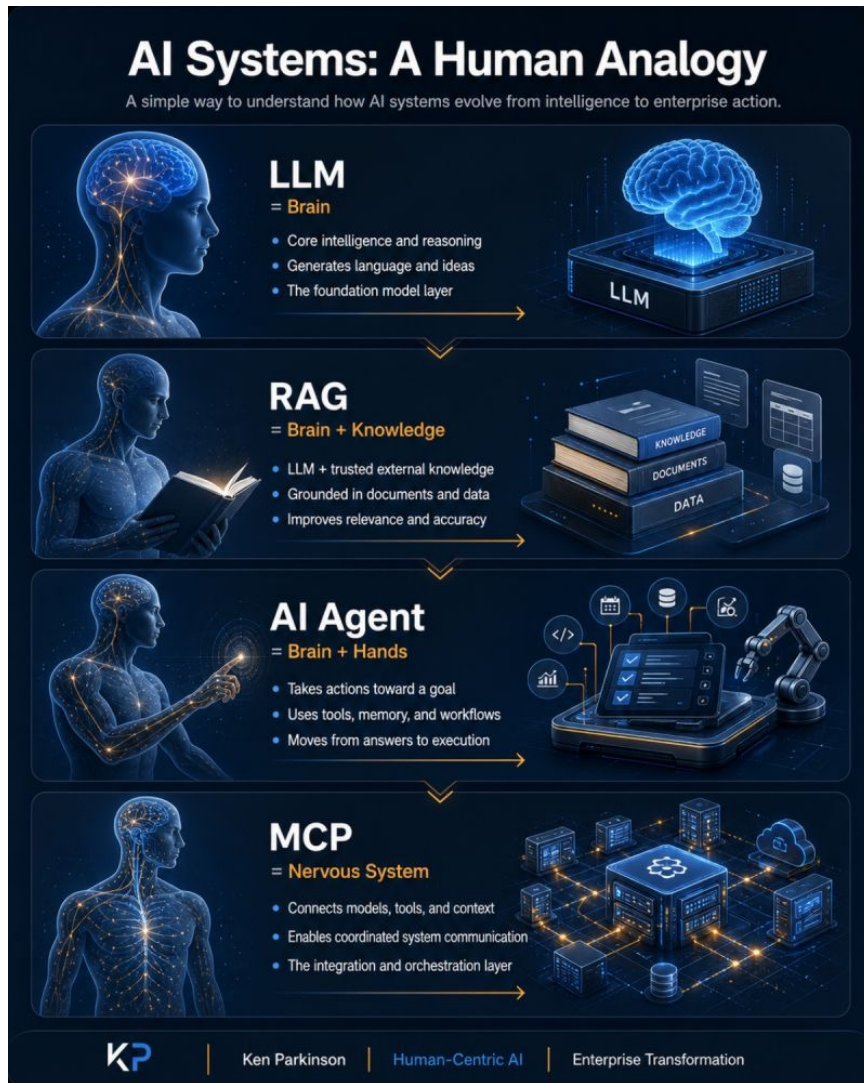
Agentic AI leverages LLM to reason, plan, and complete tasks based on your own data and existing tools.

## Physical AI

*Extends artificial intelligence into physical spaces with understanding of spatial relationships and real-world physics.*



# AI can feel like a maze of acronyms...



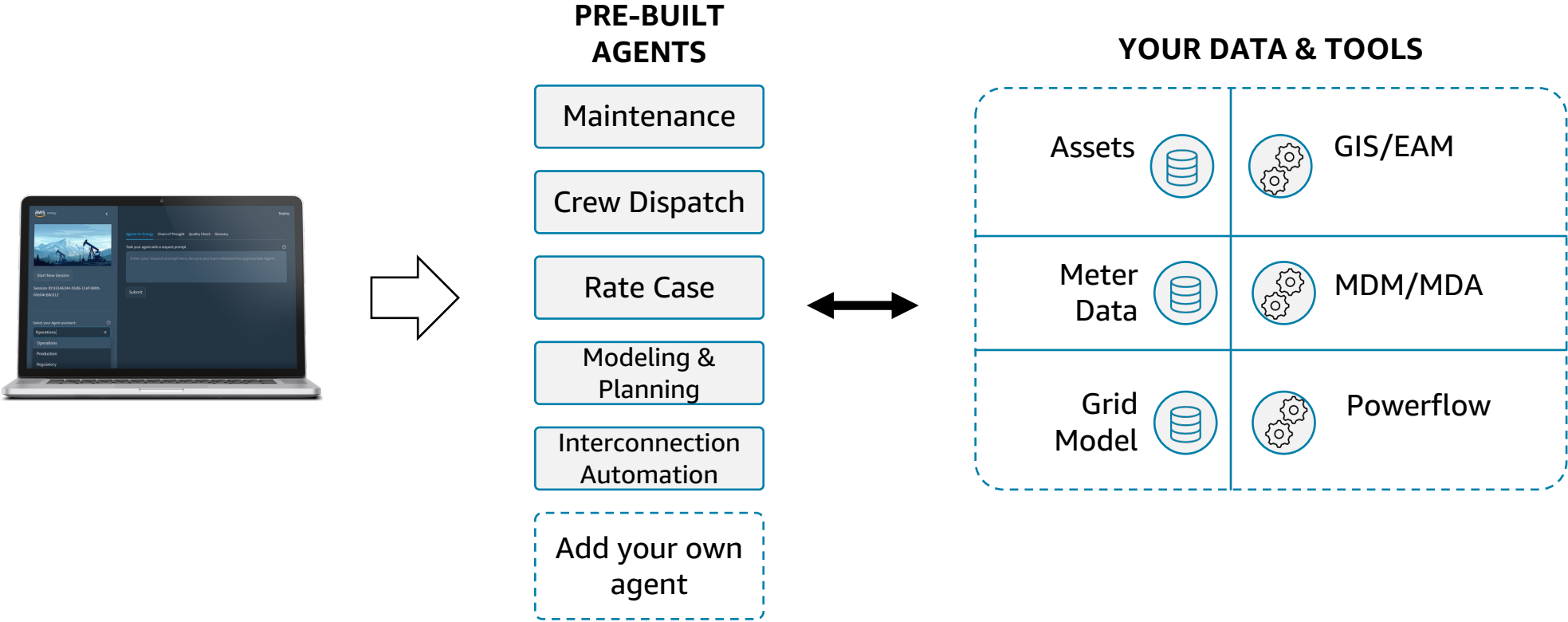
- Large Language Models (LLMs) are the brain. But it only knows what it was trained on. It does not automatically know your business, your latest data, your customer context.
- Retrieval-Augmented Generation (RAG) connects the model to trusted external information. This is where AI starts becoming more useful for the enterprise, because it can answer with context rather than guess from memory.
- AI Agents give the brain hands. This is where AI moves from answering to acting, and the conversation shifts from productivity to operating model change.
- Model Context Protocol (MCP) helps AI systems connect more consistently with tools, data sources, files, platforms, and enterprise environments.

# Grid Management AI Use Cases (non-exhaustive )

	Forecast	Plan	Operate/Trade	Serve
<b>Optimisation/ Machine Learning</b>	<ul style="list-style-type: none"> <li>• Demand Forecast (S/M/L)</li> <li>• Weather Forecasting</li> <li>• Renewable Forecast</li> <li>• Battery charge/discharge performance monitoring</li> <li>• Price Forecasting</li> </ul>	<ul style="list-style-type: none"> <li>• Assets planning</li> <li>• Digital twin</li> <li>• Flexibility planning</li> <li>• Interconnection planning</li> <li>• eMobility planning</li> </ul>	<ul style="list-style-type: none"> <li>• Algorithm Trading</li> <li>• Asset Performance Monitoring</li> <li>• Predictive Maintenance</li> <li>• Outage Prediction</li> <li>• Virtual Power Plant</li> <li>• P2P trading/Local Energy Market</li> </ul>	<ul style="list-style-type: none"> <li>• Sentiment Analysis</li> <li>• Churn Prediction</li> <li>• Call Routing</li> <li>• Call Transcription</li> <li>• Meter Data Analytics</li> <li>• Fraud detection</li> </ul>
<b>Foundation Models/Agentic AI</b>	<ul style="list-style-type: none"> <li>• Hyper-local Weather FM</li> <li>• Demand Forecast (Amazon Chronos, LLM based forecasting model)</li> <li>• Ensemble Forecasting</li> <li>• DER smart aggregation</li> <li>• Data center/EV charging demand forecasting</li> </ul>	<ul style="list-style-type: none"> <li>• Investment Analysis Agents</li> <li>• Tariff filing and Q&amp;A agents</li> <li>• Regulatory response agent</li> <li>• <b>Interconnection automation agents</b></li> <li>• <b>Model build and simulation agents</b></li> </ul>	<ul style="list-style-type: none"> <li>• Crew dispatch agent</li> <li>• Field Crew Assistant</li> <li>• Grid control room co-operator</li> <li>• Energy and Flex trading agents</li> </ul>	<ul style="list-style-type: none"> <li>• Contact Center Agents</li> <li>• Smart Home Energy Manager</li> <li>• System Flex Event Agent</li> </ul>



# AWS Agents4Energy



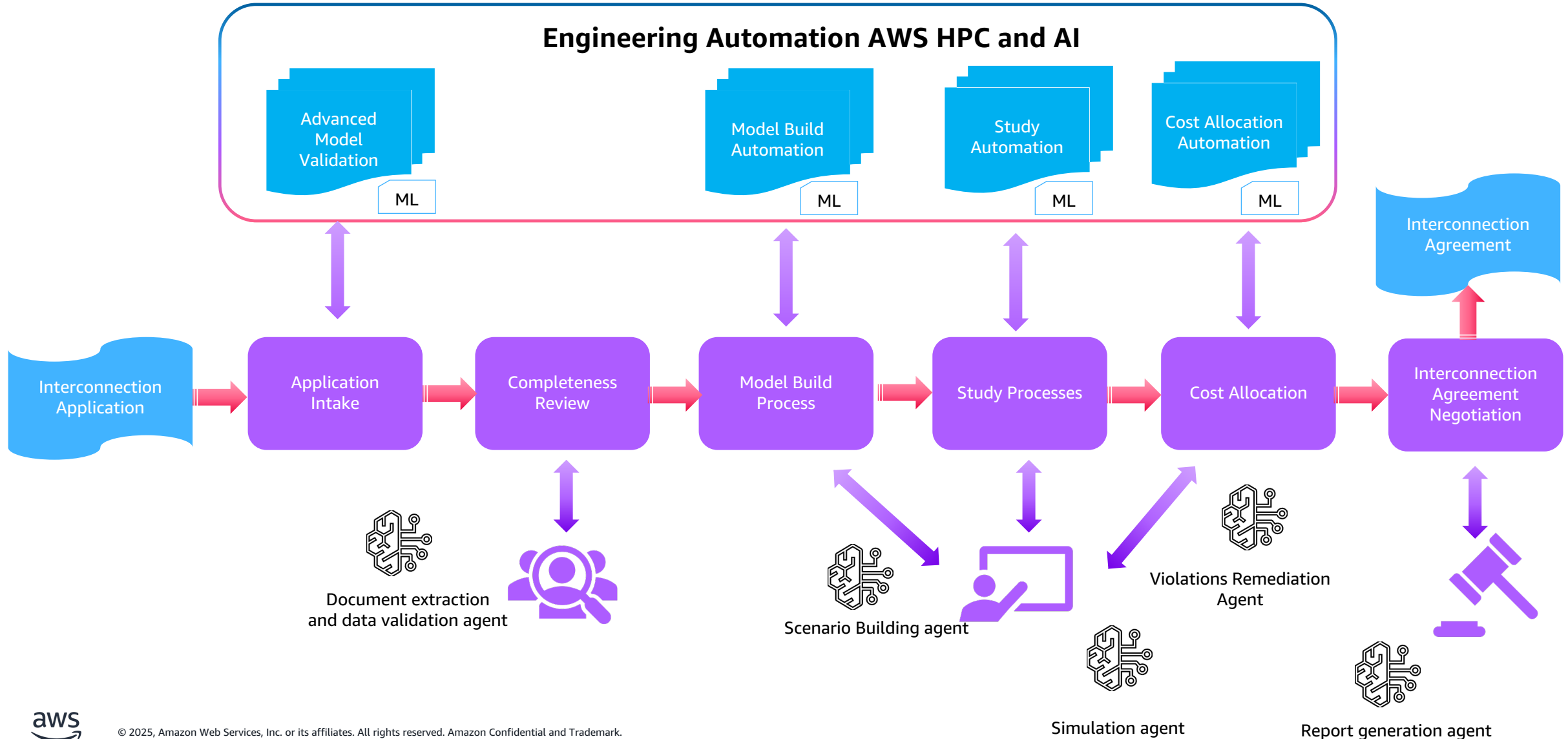
**Amazon Bedrock**  
Access to FMs to AI infrastructure

Reasoning-first models are rising: Many providers are clearly moving toward models optimized for reasoning—fueling the surge of Agentic AI architectures.

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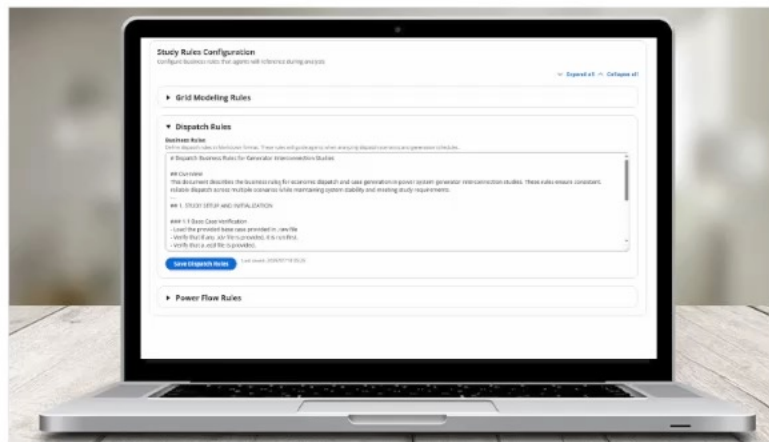


# Interconnection Study Automation with Agentic AI/ML



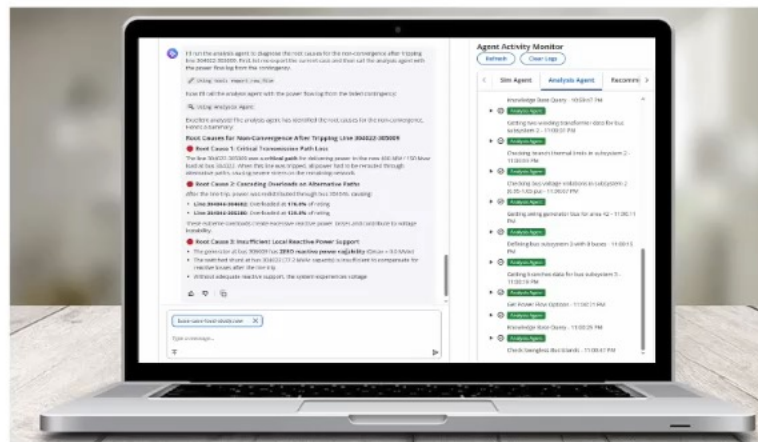
# Study Automation - The solution

A multi-agent system that assists planners in improving throughput and improving confidence in interconnection studies



## 1. Configure utility standards

Planners configure utility-specific business rules, compliance requirements, and grid models through an admin portal, enabling AI agents to validate studies against industry standards and utility planning criteria



## 2. AI Agents assist with the study workflow

Multi-agent system extracts data from interconnection documents, updates grid models, orchestrates parallel simulations across thousands of scenarios, and identifies optimal upgrade options—reducing months of manual work to hours



## 3. AI-generated analysis and recommendations

Agents generate comprehensive study reports with cost-optimized upgrade recommendations, enabling planners to review and approve in hours rather than spending months running constrained scenarios

# Gartner Predicts AI Adoption in 40% of Power and Utilities Control Rooms by 2027

STAMFORD, Conn., January 15, 2025

## 94% of Power and Utility CIOs Plan to Increase Their AI Investments in 2025, With an Average Spending Increase of 38.3%

By 2027, 40% of power and utilities will deploy AI-driven operators in control rooms, reducing human error risks, but increasing cyber-physical system security vulnerabilities, according to Gartner, Inc.

The 2025 [Gartner CIO and Technology Executive Survey](#) indicated that 94% of power and utility chief information officers (CIOs) plan to increase their AI investments in 2025, with an average spending increase of 38.3%.

“AI technology is poised to transform the power and utilities sector,” said [Jo-Ann Clynych](#), Sr Director Analyst at Gartner. “Human [decision-making](#) is critical, but it is also a significant factor in industrial accidents. AI-driven operations offer a compelling solution, performing tasks with repeatability, precision, and without bias when effectively governed.”

<https://www.gartner.com/en/newsroom/press-releases/2025-01-15-gartner-predicts-ai-adoption-in-40-percent-of-power-and-utilities-control-rooms-by-2027>



# Agentic AI based Co-Operator for Grid Control Room

