

# The Art and Science of AI - for Cogitaas

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# Agenda

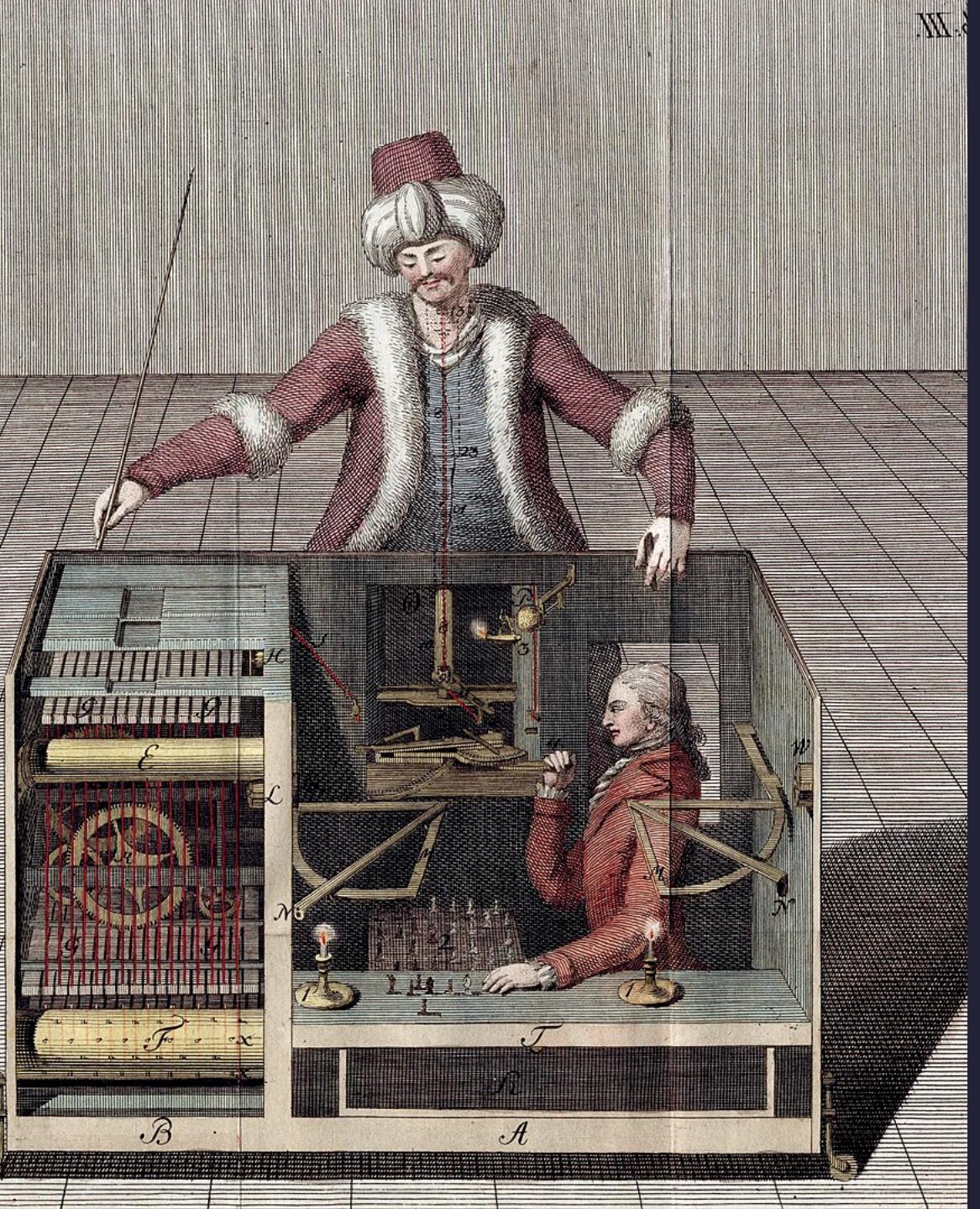
1. The **Science** of how AI works
2. The **Art** of using AI
3. AI Agents for Business (Cogitaas Perspective)

## About me

- **15 years in AI/ML:** Lead Product Manager at Meta and Adobe building AI/ML products for billions of users; Fortune 500 AI consultant at Deloitte
- **Academic foundation:** Degrees in computer science, business, logic, and philosophy from ivy league universities
- **AI educator and mentor:** Teaching the science of how AI works and the art of using AI effectively @ Art and Science of AI

# 1. The Science of how AI works

- 1.1 Ancient dreams: Myths, magic, machines
- 1.2 The birth of AI: Dartmouth 1956
- 1.3 Rule-based era (1950s-2000s): GOFAI, Expert Systems, Logic
- 1.4 Learning machines (1990s-2010s): ML, Statistical approaches
- 1.5 Deep learning revolution (2010s): Neural networks, GPUs
- 1.6 Generative era (2020s): Transformers, LLMs, Agents

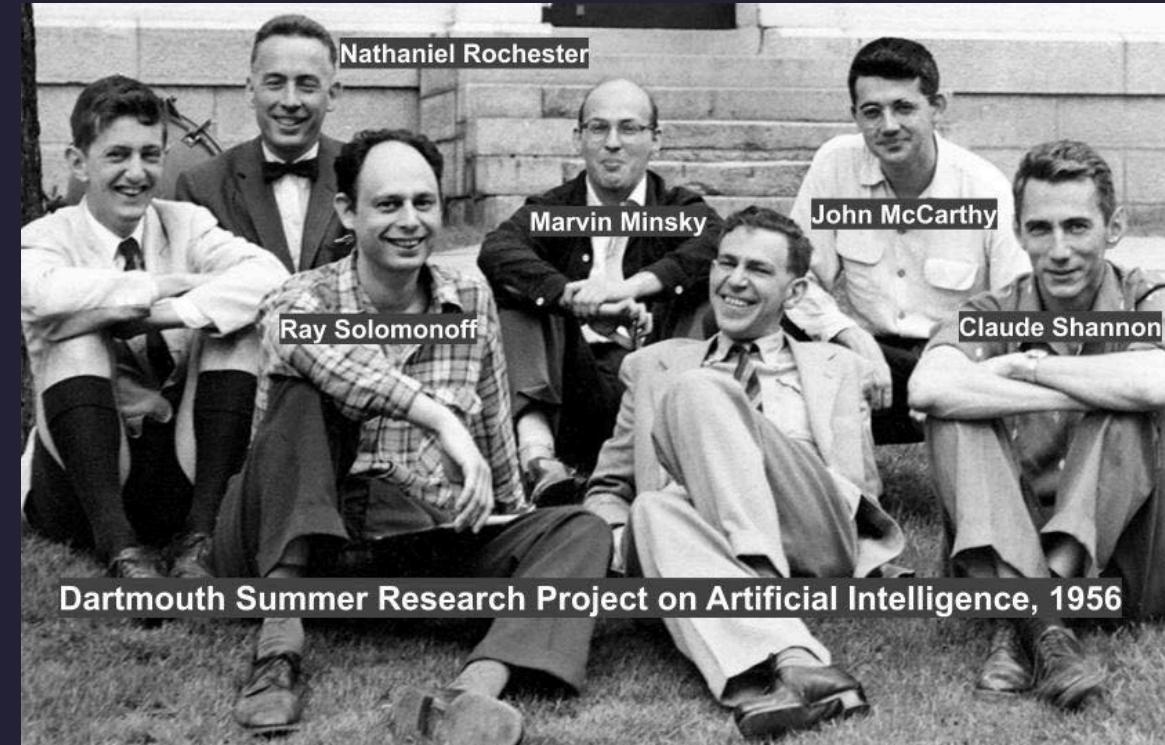


## 1.1 Ancient dreams: myths, magic, machines

- **Myths & legends:** Ancient dreams of artificial life: Greek *Talos*, Jewish *Golem*, and Indian *Yantras* guarding treasures
- **Engineering foundations:** From ancient calculating devices to modern computers laid the foundations for AI
- **The Turing test precursor:** Mechanical Turk foreshadowed modern questions about machine intelligence and human deception

## 1.2 The birth of AI: Dartmouth 1956

- *We propose that a 2-month, 10-man study of artificial intelligence be carried out during the summer of 1956 at Dartmouth College*
- *An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves.*
- *We think a significant advance can be made ... if a carefully selected group of scientists work on it together for a summer.*



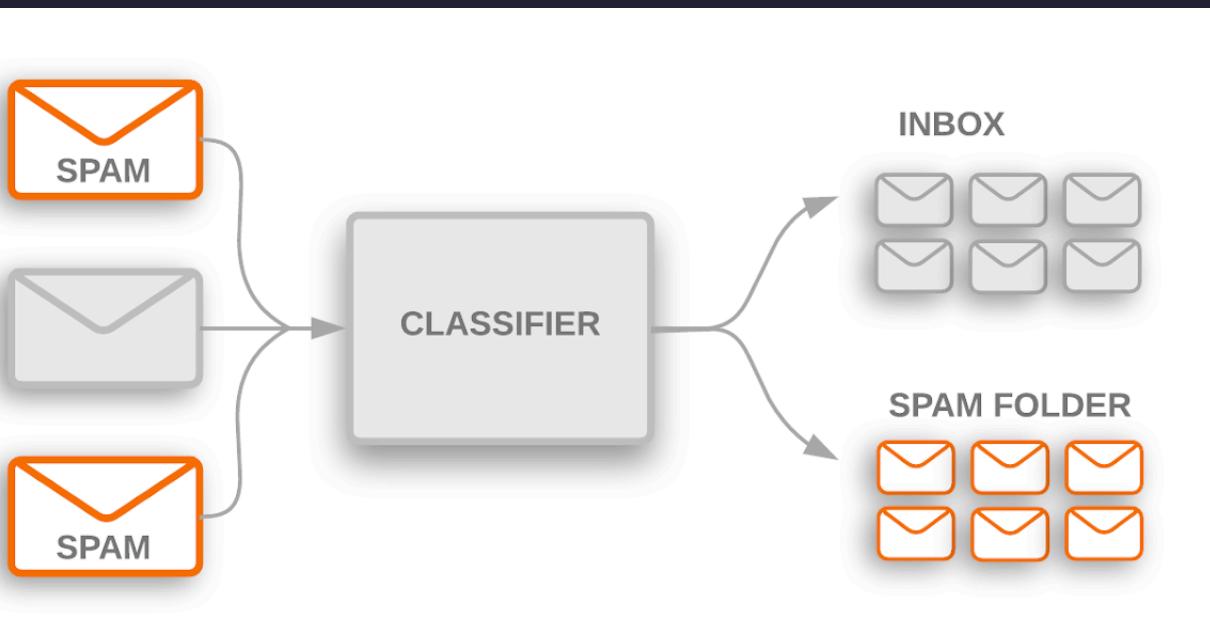
Artificial Intelligence

Rules-based  
Expert Systems

Machine Learning

Neural Nets  
Deep  
Learning

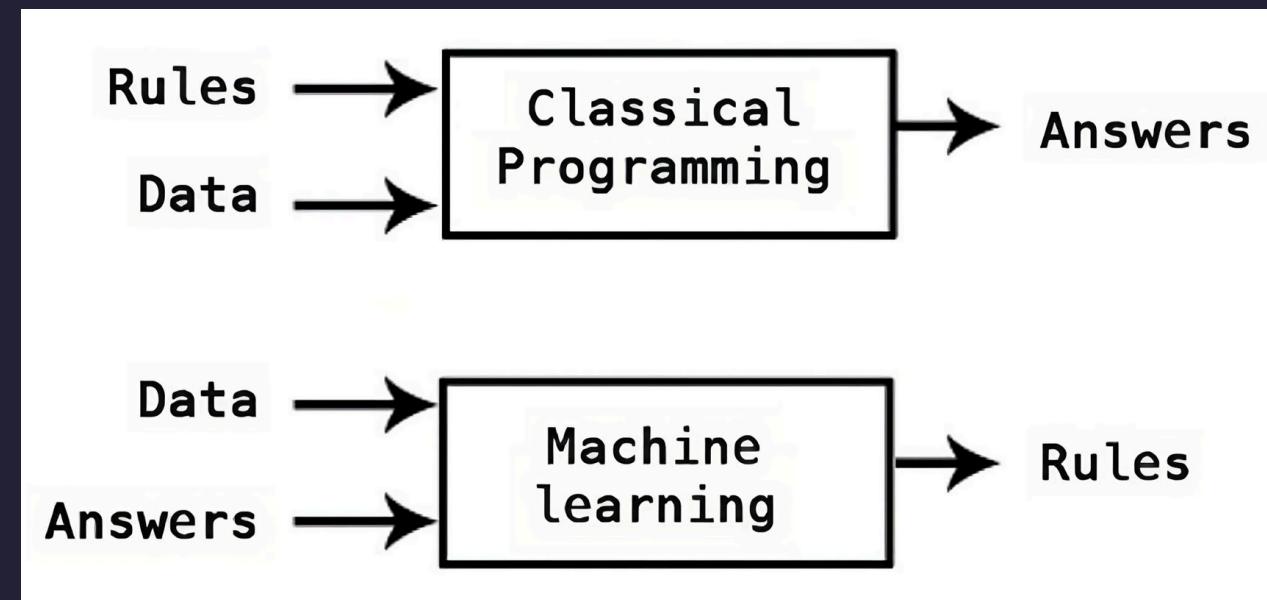
## 1.3 Rule-based era (1950s-2000s): GOFAI, Expert Systems, Logic



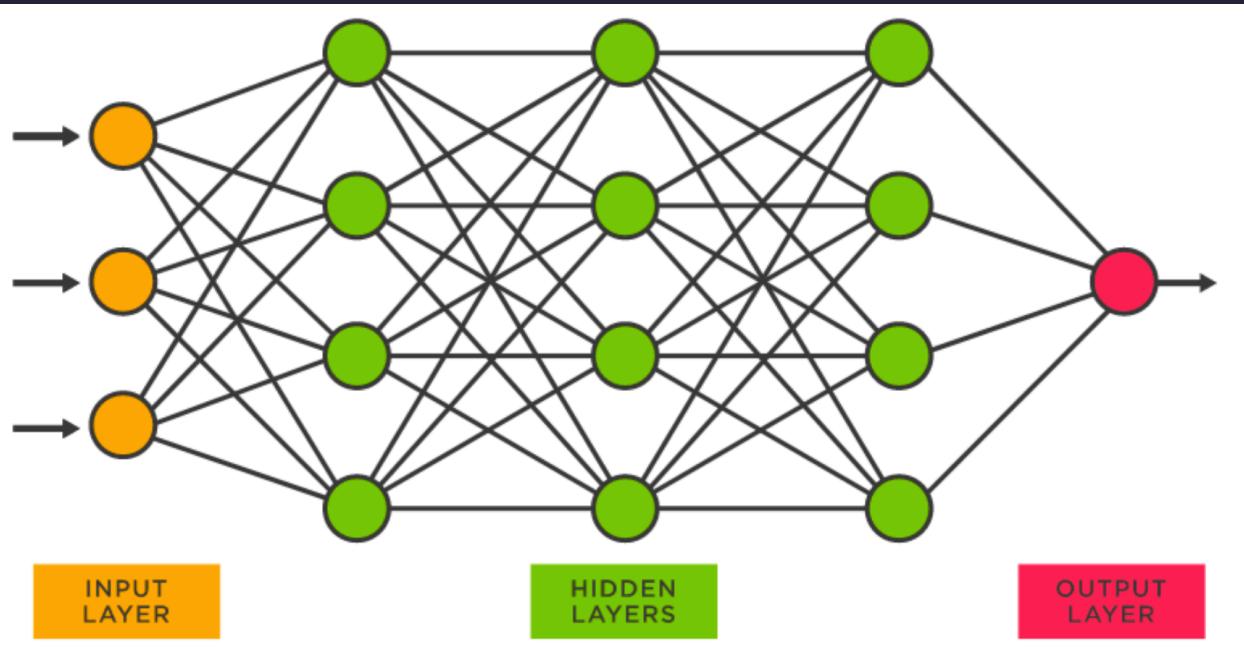
- Symbolic AI / "Good Old-Fashioned AI" (GOFAI)
- **Example:** Spam filter with explicit rules: "If email contains 'Nigerian prince', then mark as spam"
- Other examples: Deep Blue chess computer, video game AI
- **Pro:** Interpretable, logical, predictable
- **Con:** Brittle—can't handle ambiguity or "common sense"

## 1.4 Learning machines (1990s-2010s): ML, Statistical approaches

- Shift from "programming rules" to "learning patterns"
- **Example:** House price prediction learns from 10,000 past sales (bedrooms, location, size → price); Gmail spam filters, Netflix recommendations, fraud detection
- **Requirement:** Feature engineering (telling the AI what to look for)



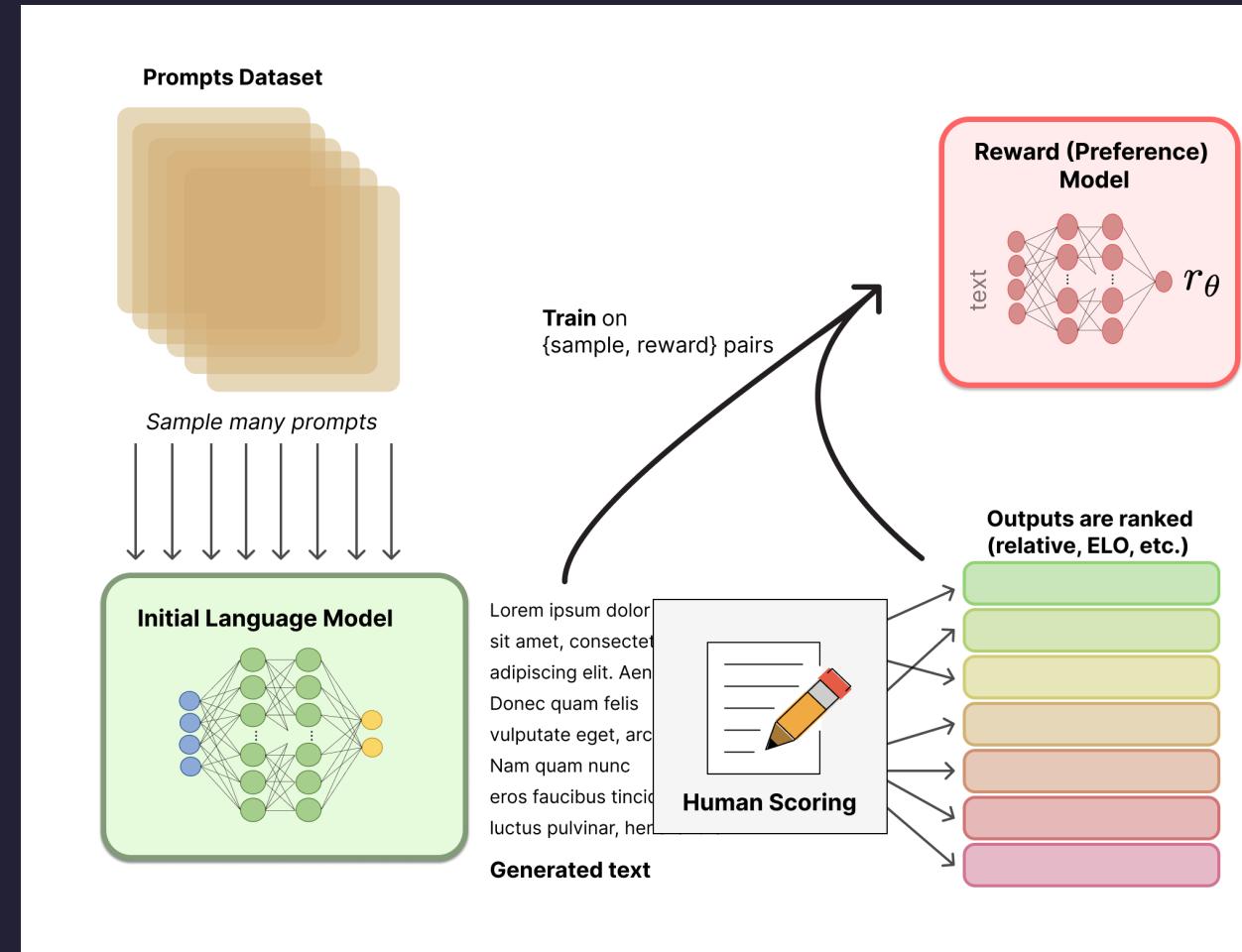
## 1.5 Deep learning revolution (2010s): Neural networks, GPUs



- Neural Networks with many layers (Deep Neural Networks)
- **Example:** Handwritten digit recognition learns patterns directly from pixel images—no feature engineering!
- **Key Drivers:** Big Data + GPUs enabled training on millions of examples
- AlphaGo defeats world champion, FaceID, Siri voice recognition

## 1.6 Generative era (2020s): Transformers, LLMs, Agents

- **Large Language Models (LLMs)**: Predict next word by learning from billions of web pages
- **Breakthrough**: 2017 Transformer architecture made this possible ("Attention is All You Need")
- **Passing the Turing test**: For the first time, AI can have natural human conversations!



## 2. The Art of using AI

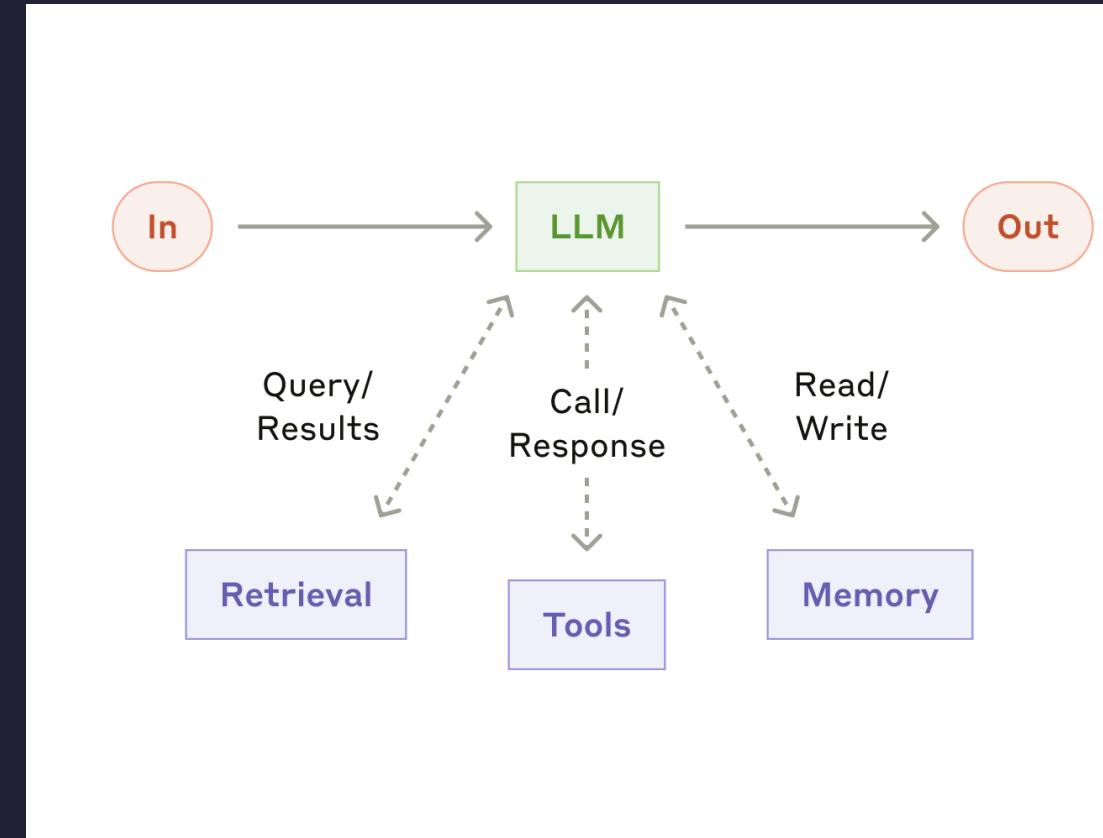
- 2.1 Research Assistant: Our Complete Example
- 2.2 Augmented LLMs: Enhanced Research Assistant
- 2.3 AI workflows: Orchestrated Research Assistant
- 2.4 AI agents: Autonomous Research Intelligence

## 2.1 Research Assistant: Our Complete Example

- Task: "Research the top AI companies"
- This example will show how AI evolves from simple prompts to autonomous agents to solve this business intelligence task.
- Limitations of vanilla LLMs: demo of [ollama](#) with [Google Gemma](#)

## 2.2 Augmented LLMs: Enhanced Research Assistant

- **Retrieval:** Access to market reports, company filings, funding databases for AI companies
- **Tools:** Financial data APIs, news search, earnings report analysis for market intelligence
- **Memory:** System prompt maintains "technology analyst specializing in AI market intelligence" role



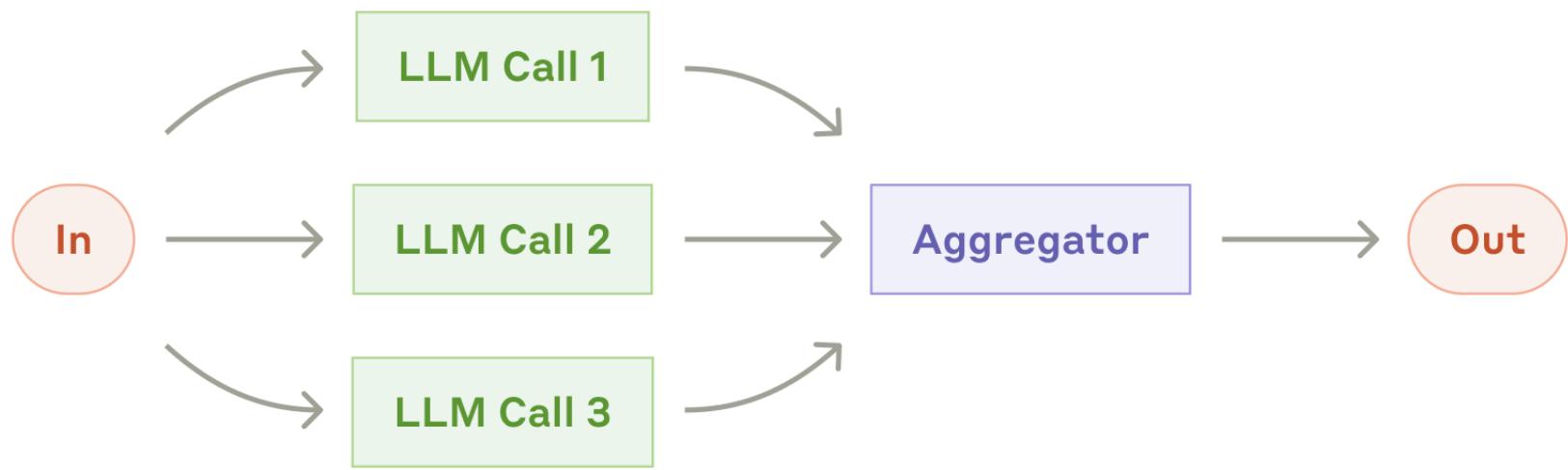
## 2.3 AI workflows: Orchestrated Research Assistant

- **Orchestrator-Workers (2.3a):** Central LLM breaks down research tasks, delegates to specialized workers, synthesizes results
- **Parallelization (2.3b):** Multiple workers research AI companies, financials, products, partnerships simultaneously for speed
- **Evaluator-Optimizer (2.3c):** Sequential cycle checks research quality, fills gaps, refines analysis for accuracy
- **Key insight:** Workflows provide predictable, efficient research through predefined orchestration patterns



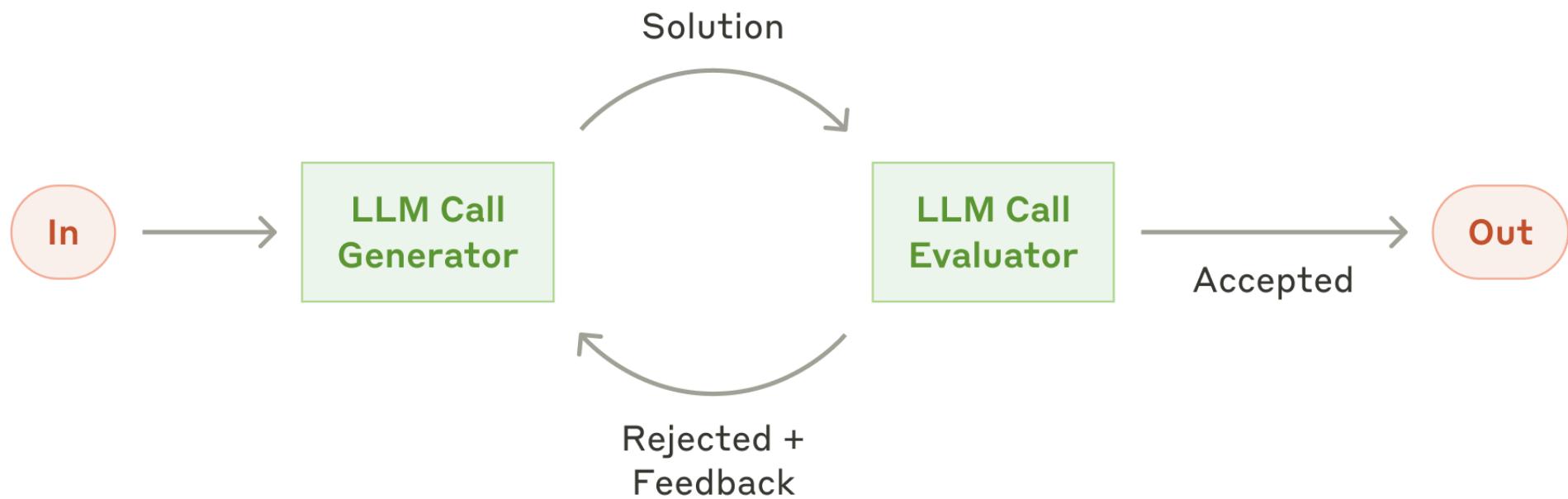
## 2.3a AI workflows: Orchestrator-Workers for AI market analysis

- **Orchestrator assigns parallel research tasks:**
  - Worker 1: Research major AI companies (OpenAI, Anthropic, Google)
  - Worker 2: Analyze financial performance and market valuation
  - Worker 3: Compare product portfolios and technological capabilities
  - Worker 4: Track funding rounds and strategic partnerships
- **Synthesis:** Combines findings into comprehensive AI market analysis



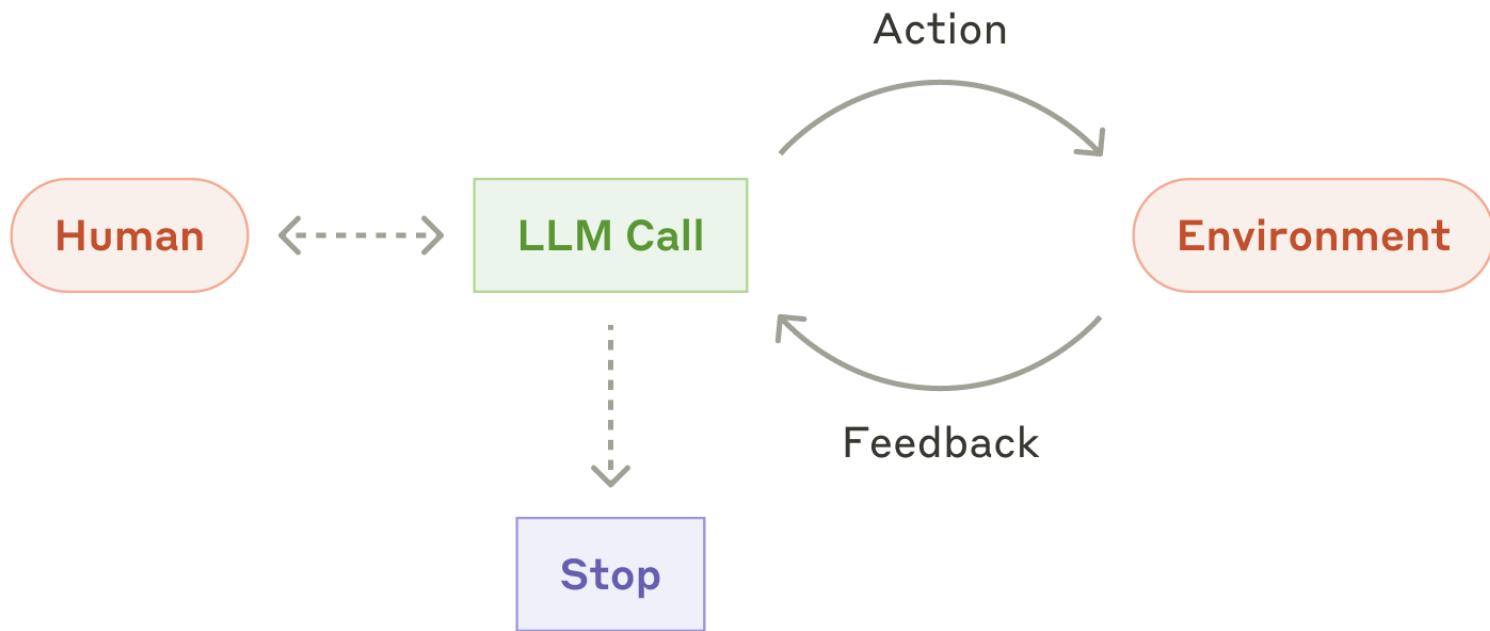
## 2.3b AI workflows: Parallel analysis for comprehensive AI market insights

- **Parallel execution speeds research significantly:**
  - Worker 1: Researches AI companies simultaneously
  - Worker 2: Analyzes financial data in parallel
  - Worker 3: Evaluates product capabilities concurrently
  - Worker 4: Tracks partnerships at same time
- **Benefit:** 4x faster than sequential research for comprehensive AI market coverage



## 2.3c AI workflows: Sequential verification and refinement for AI intelligence

- **Evaluator-Optimizer cycle for quality assurance:**
  - **Evaluator:** Checks AI market research completeness, accuracy, bias
  - **Optimizer:** Fills data gaps, refines analysis, improves insights
  - **Iteration:** Continues until research meets quality standards
- **Outcome:** High-quality, verified AI market intelligence for strategic decisions

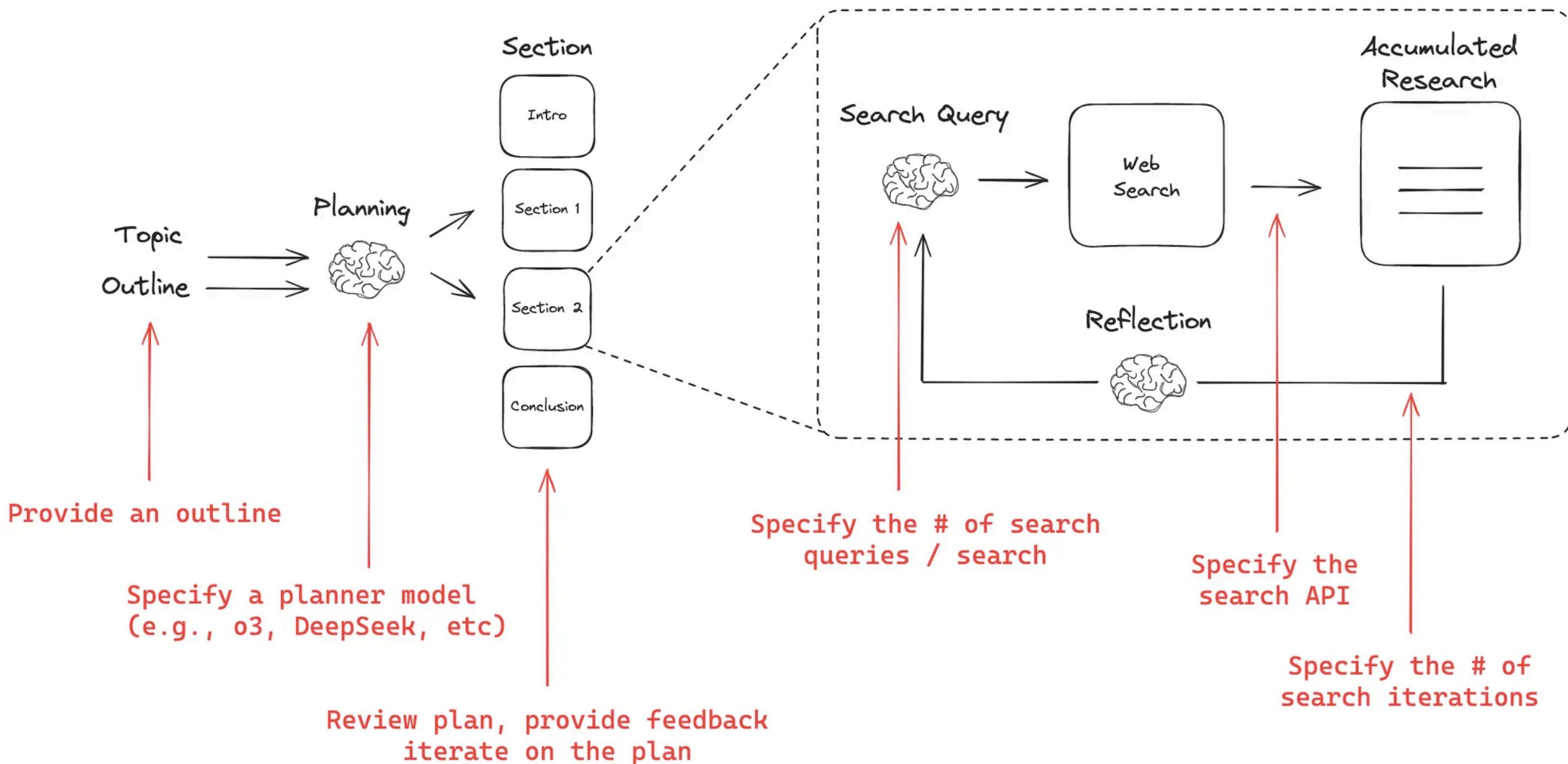


## 2.4 AI agents: Autonomous Research Intelligence

- **Autonomous agent:** Research assistant decides its own investigation strategy
- **Agent capabilities:** Plans research approach, discovers emerging trends, adapts strategy
- **Full research cycle:**
  - Identifies emerging AI companies beyond the major players
  - Follows strategic data trails (acquisitions, talent movements, regulatory changes)
  - Detects market shifts and technology trends before they become obvious
- Research assistant now can: Conduct sophisticated, adaptive AI market intelligence

# Planning / Structure

# Research



### **3. AI Agents for Business (Cogitaas Perspective)**

- 3.1 AI Agents' Role and Impact in Business
- 3.2 Implementing AI Agents in Business
- 3.3 AI Agent Applications for Cogitaas

### 3.1 AI Agents' Role and Impact in Business

- **AI Agents' Role in Business:** Automate repetitive work, enhance productivity, enable focus on higher impact tasks
- **Business Impact:** Improve quality and quantity of deliverables; enable new AI-powered solutions (e.g. AI customer service chatbot)
- **Myth Debunking:** Not plug-and-play, requires iterative development to build useful workflows and agents tailored to your business context

## 3.2 Implementing AI Agents in Business

- **Identify Opportunities:** Map repetitive workflows consuming significant time (reporting, data cleaning, customer queries)
- **Prioritize by ROI:** Compare current effort vs. AI agent implementation effort - target high-impact, low-complexity workflows first
- **Start Small, Iterate:** Build proof-of-concept for one workflow, measure results, refine, then scale to similar tasks
- **Timeline Reality:** Expect 3-6 months for initial wins, 1-2 years for deep integration - not overnight transformation

### 3.3 AI Agent Applications for Cogitaas

- **Data Pipeline Automation:** Streamlines ETL processes, data cleaning, and routine reporting tasks
- **Exploratory Data Analysis:** AI agents assist in data profiling, anomaly detection, and pattern discovery across client datasets
- **Presentation Generation:** Automates slide creation, visualizations, and executive summary writing from analytical findings
- **Client Question Answering:** AI agents retrieve insights from historical reports and datasets to answer ad-hoc client queries

**Thank you!**

Any questions?

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