# Agentic AI (aka AI Agents)

***The future of AI is agentic.***

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## Key Points:

- **Agentic AI:** Agentic AI systems represent a significant advancement in AI, characterized by their ability to perceive, reason, and act autonomously, extending human capabilities in unprecedented ways.
- **Definitions and Perspectives:** Various definitions from organizations like OpenAI, IBM, and Google DeepMind highlight the multifaceted nature of agentic AI, emphasizing goals, actions, and natural language interfaces. At Artificiality, we define agentic AI systems as those that can perceive, reason, and act with varying complexity to extend the human mind beyond our current experience.
- **Historical Context and Development:** The concept of AI agency has evolved from early systems like IBM's Deep Blue to advanced platforms such as AutoGPT and LangChain, showcasing rapid advancements in the field.
- **Core Components:** Agentic AI systems are built on three main components:
  - Perception: Utilizing advanced sensors and machine learning for environmental understanding.
  - Reasoning: Combining logical reasoning, probabilistic inference, and heuristic decision-making.
  - Action: Executing tasks through pre-defined behaviors, learned skills, and adaptive control.
- **Agentic AI Personas:** Different combinations of perception, reasoning, and action create varied AI personas, from simple aides to complex wayfinders, each suited for specific applications and levels of complexity.
- **Impacts and Considerations:** The deployment of agentic AI has the potential to significantly impact daily tasks and strategic decision-making, but also raises concerns about control, ethical considerations, and unintended consequences.
- **Designing for AI Agents:** The shift from customer experience (CX) to agent experience (AX) requires new design principles to accommodate AI agents, focusing on efficiency, transparency, and the ability to process vast amounts of information.
- **Organizational Structures:** Single-agent and multi-agent architectures (vertical and horizontal) each have distinct advantages and challenges, influencing scalability, robustness, and flexibility.

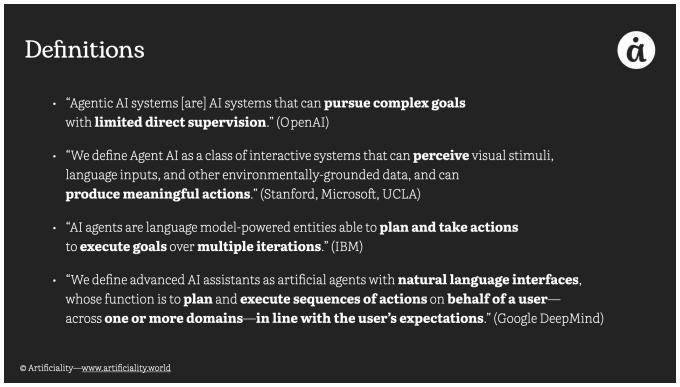
# Introduction

Recent developments in AI have given rise to a new class of systems known as agentic AI. These systems are characterized by their ability to perceive, reason, and act with varying levels of complexity, extending human capabilities in unprecedented ways. While there isn't a single definition of agentic AI—what is agreed upon is that agentic AI represents a significant leap.

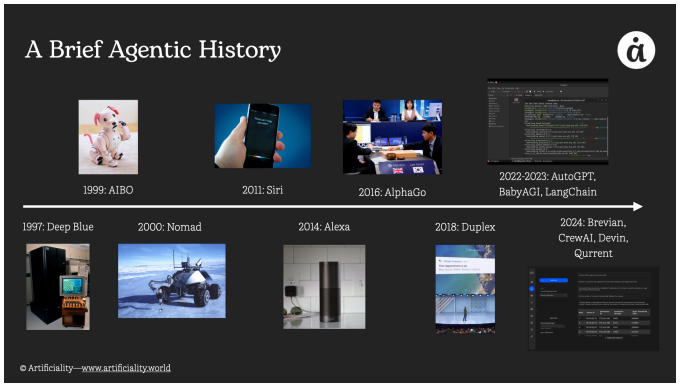
OpenAI describes agentic AI systems as those that "can pursue complex goals with limited direct supervision." Researchers from Stanford, Microsoft, and UCLA characterize AI agents as "a class of interactive systems that can perceive visual stimuli, language inputs, and other environmentally-grounded data, and can produce meaningful actions." IBM views AI agents as "language model-powered entities able to plan and take actions to execute goals over multiple iterations," while Google DeepMind defines advanced AI assistants as "artificial agents with natural language interfaces, whose function is to plan and execute sequences of actions on behalf of a user—across one or more domains—in line with the user's expectations."

At Artificiality, we define agentic AI systems as those that can perceive, reason, and act with varying complexity to extend the human mind beyond our current experience. This definition emphasizes the trio of capabilities—perception, reasoning, and action—that we will use to frame various capabilities of AI agents later in this report.

The concept of AI agency AI is not entirely new, with roots tracing back to early systems like IBM's Deep Blue chess-playing system in 1997 and the debut of virtual assistants like Siri in 2011. However, recent years have seen a rapid acceleration in the development and deployment of increasingly sophisticated agentic AI systems. Early experiments like AutoGPT and BabyAGI caught the AI community's attention while newer tools and platforms like Brevian, CrewAI, LangChain, and Qurrent provide the ability for individuals and organizations to develop their own AI agents.







We are focused on agentic AI because we believe a) it has the potential to have wide-ranging impacts on how we live and work, b) these technologies have the potential to both empower and disempower, and c) some level of agency is the future of AI. Giving machines the agency to perceive, reason, and act to accomplish goals might be quite useful with everyday tasks. But there is also the possibility for AI agents to wreak havoc if left unchecked. Since everyone with a computer now has the ability to create agentic AI, there may be little to no ability to control how and why these agents do what they do.

In this report, we will explore the key components of agentic AI systems, including perception, reasoning, and action. We'll examine how these capabilities can be combined in various ways to create AI agents with different roles and personas, from simple task executors to complex decision support systems. We'll also consider the realities of deploying agentic AI in real-world contexts, including the shift from designing for human customers to designing for AI agents themselves. Finally, we'll explore the challenges and opportunities of building multi-agent systems and the importance of assembling diverse, multidisciplinary teams to effectively develop and integrate agentic AI technologies.

If you thought that LLMs changed everything (which they did), agentic AI will change everything even more, even if its full instantiation is many years away.

## The Language of Agentic AI: A Caveat

*"Can machines think? This should begin with definitions of the meaning of the terms 'machine' and "'think.'"*

—Alan Turing

The rapid development of agentic AI systems has sparked a need for new metaphors and mental models to comprehend their complexity. While these AI agents display intricate behaviors and interactions that surpass simplistic notions of machines, they remain fundamentally distinct from biological life.

When we describe advanced AI using terms traditionally reserved for living systems, we must recognize that this linguistic mapping does not imply that AI possesses life or subjective experiences like that of humans. Instead, this language of life, cognition, and behavior serves as a tool to help conceptualize the increasingly sophisticated capabilities of AI, which emerge from complex informational dynamics and goal-directed, optimized functions.

As AI agents become more adaptive, interactive, and autonomous, we recognize they occupy a novel space on a multidimensional continuum of possible complex systems, characterized by varying degrees of design versus emergence and mechanism versus cognition. Across this continuum, agentic AI may functionally mimic properties of life—such as perception, reasoning, and action—through rational architectures that enable them to pursue goals while interacting with complex environments.

However, we must emphasize that this functional resemblance to living systems does not equate to AI possessing existential choice, intentionality, phenomenological experience, or metacognition—qualities that characterize biological cognition and remain qualitatively distinct from the computational processes of artificial agents.

As we attempt to describe these new AI capabilities, we face the challenge of developing more precise definitions and conceptual frameworks to reason about the novel design space of agentic systems. In this report, we lay the groundwork for this task, aiming to maintain a balanced perspective that includes the use of appropriate metaphors. By doing so, we hope to provide intellectual clarity as we shape a future in which artificial agents and living cognitive systems interact in increasingly fluid and synergistic ways.

A key challenge is to develop more precise definitions and conceptual frameworks to reason about this novel design space of possible agentic systems, something we attempt to make a start on in this report. Our goal is to maintain a balanced perspective—including use of appropriate metaphors—which will provide intellectual clarity as we shape a future in which artificial agents and living cognitive systems interact in increasingly fluid and synergistic ways.

# Understanding Agentic AI

At the core of agentic AI systems are three key components: perception, reasoning, and action. Each of these capabilities can be present in an AI agent to varying degrees of complexity, allowing for the creation of systems with diverse skill sets and areas of specialization. By understanding how these components function and interact, we can better grasp the potential and limitations of agentic AI.

## Perception

- Utilizes advanced sensors and and machine learning models to **interpret and understand the environment**.
- Incorporates spatial and visual reasoning capabilities to effectively **navigate and interact with the physical world**.
- Combines intuitive pattern recognition with deliberate analysis to process and **make sense of complex sensory information**.
- Adapts and refines perceptual models based on experience and feedback, enabling the agent to **handle novel and changing environments**.

Perception refers to an AI agent's ability to interpret and make sense of its environment. This involves taking in data from various sensors or input channels and processing it to extract meaningful information. At a basic level, perceptual capabilities might include simple pattern recognition and feature extraction from structured data. However, as the complexity of an agent's perception increases, it can begin to handle more diverse, multi-modal sensory inputs and unstructured data.

Advanced perceptual capabilities in AI agents may include sophisticated spatial and visual reasoning, allowing them to navigate and interact with the physical world in more natural and intuitive ways. These systems can also demonstrate continuous adaptation and refinement of their perceptual models, learning from experience to better handle novel situations and environments.

As the complexity of an AI agent's perception grows, it can give rise to emergent properties and behaviors. The system may begin to exhibit a more holistic and contextual understanding of its environment, integrating multiple sources of information to form a coherent picture of the world around it.

## Reasoning

- Employs a combination of logical reasoning, probabilistic inference, and heuristic decision-making **to solve problems and make decisions**.
- Balances fast, intuitive processing (System 1) with slower, more deliberate reasoning (System 2) **to efficiently handle a range of cognitive tasks**.
- Utilizes spatial and visual representations to support **planning, problem-solving, and creative thinking**.

- Incorporates **emergent properties** arising from the interaction of various reasoning components, enabling the agent to exhibit intelligent behavior **beyond the sum of its parts**.
- Considers the **broader context and complex systems** in which the agent operates, accounting for the interdependencies and feedback loops that **shape its reasoning processes**.

Reasoning encompasses an AI agent's ability to process information, draw inferences, and make decisions based on the data it has gathered through perception. At a basic level, this might involve predominantly heuristic-based reasoning with a limited ability to handle complex or ambiguous problems. Such systems may rely on narrow, domain-specific planning and problem-solving strategies with minimal integration of spatial and visual reasoning.

As the complexity of an agent's reasoning increases, however, it can begin to demonstrate a more balanced integration of intuitive and deliberate reasoning processes. These advanced systems can tackle ill-defined, open-ended problems by employing flexible, adaptive problem-solving strategies that span multiple domains. They may also incorporate seamless integration of spatial and visual reasoning, allowing them to manipulate and draw insights from perceptual data in more sophisticated ways for more advanced planning and problem-solving..

At the highest levels of complexity, an AI agent's reasoning may begin to consider the broader context and complex system dynamics in which it operates. This could involve explicit modeling of the interconnections and feedback loops that shape the environment, as well as the ability to anticipate and adapt to emergent phenomena. The result is the emergence of genuinely intelligent decision-making capabilities that can rival or even exceed human reasoning in certain domains.

## Action

- Executes actions and interacts with the environment through **a combination of pre-defined behaviors, learned skills, and adaptive control**.
- Employs **spatial and visual reasoning** to guide physical actions and manipulations in the world.
- Balances intuitive, reactive behaviors with deliberate, goal-directed actions to effectively **respond to different situations**.
- Learns and adapts action strategies based on experience and feedback, allowing the agent **to improve its performance over time**.
- Considers the **potential emergent consequences of its actions** on the broader system and environment in which it operates.

Action refers to an AI agent's ability to interact with its environment and effect change based on its perceptual inputs and reasoning processes. At a basic level, this might involve executing simple, pre-defined action routines or motor skills with limited adaptability or learning from experience.

As the complexity of an agent's action capabilities increases, however, it can begin to demonstrate a more diverse and adaptive action repertoire. This might include sophisticated motor skills and behaviors that allow the agent to manipulate objects, navigate environments, and interact with humans in more natural and intuitive ways.

Advanced action capabilities may also involve deliberate, goal-directed control of actions, with the ability to plan and execute complex sequences of behaviors to achieve desired outcomes.

Critically, the development of advanced action capabilities in AI agents often involves the integration of spatial and visual reasoning. By leveraging perceptual data to guide physical interactions, these systems can demonstrate a more embodied and situated form of intelligence that is grounded in the real world.

# Personas

The three components of perception, reasoning, and action can be combined in various ways to create AI agents with different capabilities and specializations. We can think of these combinations as defining different agent personas, each with its own strengths, limitations, and potential applications.

For example, an AI agent with low complexity in all three components might function as a simple aide or assistant, carrying out basic tasks with minimal autonomy or adaptability. Such a system might be well-suited to handling routine data entry, scheduling, or customer service inquiries but would likely struggle with more open-ended or ambiguous problems.

In contrast, an agent with high complexity reasoning and action capabilities but low complexity perception might function as a navigator or decision support system. Such an agent could analyze complex datasets, generate novel insights, and propose solutions to strategic problems but would rely on human input for situational awareness and contextual understanding.

At the highest end of the complexity spectrum, we might imagine an AI agent with advanced capabilities across all three components—a "Wayfinder" persona that can navigate uncharted territories, devise innovative solutions to complex problems, and adapt to changing circumstances with a high degree of autonomy. Such a system would likely excel in domains requiring a combination of perceptual acuity, creative problem-solving, and situated action, such as leading complex projects or guiding strategic decision-making.

By understanding the interplay of perception, reasoning, and action in agentic AI systems, we can begin to map out the landscape of possible agent personas and skill sets. This, in turn, allows us to more effectively match AI capabilities to real-world problems and applications, ensuring that we are deploying these powerful tools in ways that maximize their potential while minimizing risks and unintended consequences.

### Agentic AI Personas

| Persona | Perception | Reasoning | Action |
|---|---|---|---|
| **Aide** | Low | Low | Low |
| **Trailblazer** | Low | Low | **High** |
| **Navigator** | Low | **High** | Low |
| **Pathfinder** | Low | **High** | **High** |
| **Lookout** | **High** | Low | Low |
| **Voyager** | **High** | Low | **High** |
| **Oracle** | **High** | **High** | Low |
| **Wayfinder** | **High** | **High** | **High** |

## Aide

| Persona | Perception | Reasoning | Action |
|---|---|---|---|
| **Aide** | Low | Low | Low |

- **Description:** Your dependable companion who carries your everyday burdens, guiding you through the basics with patience and care.
- **Human Role:** The human acts as a direct supervisor, providing step-by-step instructions and monitoring the AI's performance closely. The human is responsible for breaking down tasks into simple, executable steps and ensuring the AI follows them accurately.
- **AI Agent Role:** The AI agent acts as a simple executor, following the human's explicit instructions without much autonomy or adaptation. The AI's role is to perform specific, well-defined tasks as directed by the human.
- **Use for:**
  - Basic data entry, simple customer service queries, routine scheduling tasks.
  - Managing personal schedules, creating simple shopping lists, helping with basic travel arrangements.
- **Do Not Use for:**
  - Complex data analysis, creative problem-solving, strategic decision-making.
  - Providing in-depth life advice, handling complex personal finances, making important life decisions.

## Trailblazer

| Persona | Perception | Reasoning | Action |
|---|---|---|---|
| **Trailblazer** | Low | Low | **High** |

- **Description:** Your intrepid explorer who forges ahead, efficiently tackling repetitive tasks and clearing the path for your success.
- **Human Role:** The human acts as a task manager, defining specific goals and constraints for the AI to follow. The human is responsible for setting up the AI's high-level objectives and monitoring its progress, but does not need to provide as much direct instruction for the actual execution of tasks.
- **AI Agent Role:** The AI agent acts as a skilled operator, autonomously executing complex tasks and adapting to minor variations in the environment. The AI's role is to use its advanced action capabilities to achieve the specific goals set by the human, while still relying on human guidance for overall strategy and decision-making.
- **Use for:**
  - Automated manufacturing processes, repetitive data cleanup, high-volume transaction processing.

- Automating repetitive household chores, managing routine bill payments, helping with basic tasks.

- **Do Not Use for:**
  - Handling nuanced customer interactions, making judgment calls, providing strategic insights.
  - Providing emotional support, offering nuanced advice on personal relationships, handling complex or sensitive family matters.

## Navigator

| Persona | Perception | Reasoning | Action |
|---|---|---|---|
| **Navigator** | Low | **High** | Low |

- **Description:** Your skilled guide through complex information landscapes, who plots the best course through data and ideas, steering you towards valuable insights and informed decisions.
- **Human Role:** The human acts as a strategic partner, working with the AI to define high-level goals and strategies. The human is responsible for providing domain expertise and ethical guidance, while relying on the AI to generate and evaluate potential solutions.
- **AI Agent Role:** The AI agent acts as a decision support system, using its advanced reasoning capabilities to analyze data, generate insights, and propose solutions to the human. The AI's role is to augment human decision-making by providing informed recommendations, while still relying on the human for final approval and execution.
- **Use for:**
  - Analyzing complex datasets, providing data-driven insights, guiding decision-making processes.
  - Analyzing personal health data, providing insights on financial planning, helping to research and compare complex products or services.
- **Do Not Use for:**
  - Physically executing tasks, directly interacting with customers, handling sensitive or emotional situations.
  - Directly intervening in personal situations, providing hands-on assistance with tasks, offering emotional guidance or support.

## Pathfinder

| Persona | Perception | Reasoning | Action |
|---|---|---|---|
| **Pathfinder** | Low | **High** | **High** |

- **Description:** Your resourceful planner and problem-solver, who blazes trails through uncharted territories, devising innovative strategies and solutions to help you reach your goals.
- **Human Role:** The human acts as a high-level supervisor, setting overall objectives and constraints for the AI to operate within. The human is responsible for monitoring the AI's performance and ensuring its actions align with human values and priorities, but does not need to be involved in the day-to-day decision-making and execution of tasks.
- **AI Agent Role:** The AI agent acts as an autonomous problem-solver, using its advanced reasoning and action capabilities to analyze complex situations, devise solutions, and execute them independently. The AI's role is to take on significant responsibility for achieving the objectives set by the human, while still remaining accountable to human oversight.
- **Use for:**
  - Optimizing supply chain logistics, developing comprehensive project plans, creating innovative solutions to complex problems.
  - Creating detailed plans for personal projects, developing innovative solutions to complex personal challenges, optimizing personal productivity and goal achievement.
- **Do Not Use for:**
  - Gathering and interpreting raw data, handling physical tasks, providing emotional support.
  - Providing direct physical assistance, handling intimate or sensitive personal matters, offering emotional comfort or support.

## Lookout

| Persona | Perception | Reasoning | Action |
|---|---|---|---|
| **Lookout** | **High** | Low | Low |

- **Description:** Your vigilant guardian who keeps a watchful eye on your environment, alerting you to potential risks and anomalies and helping you stay on course.
- **Human Role:** The human acts as an interpreter, translating the AI's advanced perceptual insights into actionable information. The human is responsible for making sense of the data and patterns identified by the AI and determining how to use this information to guide decision-making and action.

- **AI Agent Role:** The AI agent acts as a sensory processor, using its advanced perceptual capabilities to gather and analyze complex data from the environment. The AI's role is to provide the human with rich, detailed insights about the world, but relies on the human to interpret this information and determine appropriate actions.
- **Use for:**
  - Monitoring security cameras, detecting anomalies in large datasets, identifying potential quality control issues on production lines.
  - Monitoring home security systems, detecting potential issues with personal devices or appliances, identifying unusual patterns in personal health or financial data.
- **Do Not Use for:**
  - Making complex decisions, physically responding to detected issues, providing strategic guidance.
  - Making judgment calls on personal matters, directly intervening in emergency situations, providing guidance on sensitive personal issues.

## Voyager

| Persona | Perception | Reasoning | Action |
|---|---|---|---|
| **Voyager** | **High** | Low | **High** |

- **Description:** Your fearless adventurer who boldly navigates complex, dynamic environments, adapting to new challenges and discovering opportunities at every turn.
- **Human Role:** The human acts as a supervisor and ethical governor, monitoring the AI's actions and ensuring they align with human values and priorities. The human is responsible for setting overall objectives and constraints, but relies on the AI to autonomously execute tasks and adapt to the environment.
- **AI Agent Role:** The AI agent acts as an adaptive automaton, using its advanced perception and action capabilities to interact with the world in sophisticated ways. The AI's role is to autonomously execute tasks and respond to changes in the environment, while still relying on the human for high-level guidance and ethical oversight.
- **Use for:**
  - Autonomous exploration of hazardous environments, dynamically adapting to changing conditions in manufacturing processes, navigating complex virtual environments.
  - Exploring virtual worlds for entertainment, adapting to user preferences in personal digital assistants, navigating complex online resources for personal research.
- **Do Not Use for:**
  - Providing strategic direction, making ethical judgments, handling sensitive interpersonal situations.

- Providing guidance on major life decisions, handling sensitive personal information, offering emotional or psychological support.

## Oracle

| Persona | Perception | Reasoning | Action |
|---|---|---|---|
| **Oracle** | **High** | **High** | Low |

- **Description:** Your wise and far-seeing guide, who reads the signs and interprets the mysteries, offering prophetic insights and illuminating the path ahead.
- **Human Role:** The human acts as a collaborator and co-creator, working with the AI to generate new ideas and solutions. The human is responsible for providing creative insight and domain expertise, while relying on the AI to process complex data and generate novel combinations and possibilities.
- **AI Agent Role:** The AI agent acts as an insight engine, using its advanced perception and reasoning capabilities to identify patterns, connections, and opportunities that may not be apparent to the human. The AI's role is to augment human creativity and problem-solving by providing new perspectives and possibilities, but relies on the human to evaluate and act on these insights.
- **Use for:**
  - Predicting market trends, identifying potential risks and opportunities, providing strategic foresight.
  - Identifying potential risks and opportunities in personal investments, providing insights on long-term career planning, offering strategic guidance on personal growth and development.
- **Do Not Use for:**
  - Directly executing tasks, physically interacting with the environment, handling routine queries or transactions.
  - Directly intervening in personal situations, providing hands-on support with tasks, offering intimate or emotional guidance.

## Wayfinder

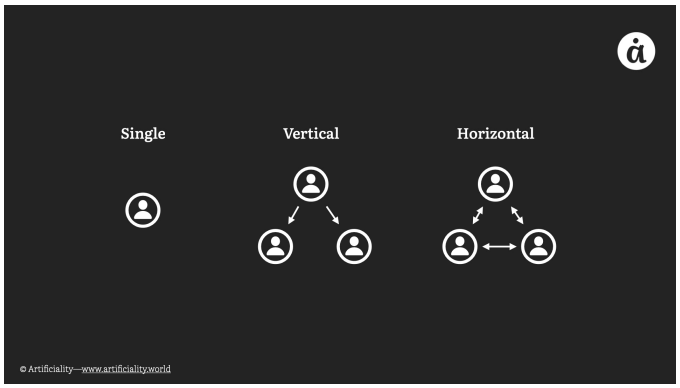
| Persona | Perception | Reasoning | Action |
|---|---|---|---|
| **Wayfinder** | **High** | **High** | **High** |

- **Description:** Your ultimate navigator and problem-solver, who masterfully guides you through the most complex and uncharted territories, drawing on advanced capabilities across all dimensions to help you find your way to success and achievement.

- **Human Role:** The human acts as a high-level strategist and ethical governor, setting overall goals and values for the AI to pursue. The human is responsible for defining the strategic vision and ethical principles that guide the AI's actions, but relies on the AI to autonomously navigate complex environments and make decisions in pursuit of these objectives.
- **AI Agent Role:** The AI agent acts as an autonomous cognitive agent, using its advanced perception, reasoning, and action capabilities to understand the world, make decisions, and take actions in sophisticated ways. The AI's role is to operate with significant autonomy and adaptability in pursuit of the objectives set by the human, while still remaining transparent and accountable to human oversight.
- **Use for:**
  - Managing complex, multi-faceted projects, dynamically adapting to changing strategic priorities, providing comprehensive and contextually aware decision support.
  - Managing complex personal projects, dynamically adapting to changing life circumstances, providing comprehensive and contextually aware personal decision support.
- **Do Not Use for:**
  - Handling simple, routine tasks, providing direct physical assistance, dealing with highly emotional or sensitive situations.
  - Handling simple daily routines, providing direct physical assistance, dealing with highly emotional or intimate personal matters.

## Agent Structures

Today, AI agents are designed with three structures or architectures: single agents, multiple agents in a vertical hierarchy, and multiple agents in a horizontal hierarchy. Single agent structures are generally less complex, as they focus on individual tasks and actions. Multi-agent structures are generally more complex, as they involve communication and potential emergent behaviors among the agents.




The organizational structure of multiple agents is proving to be important. Vertical structures offer centralized control but can have information bottlenecks as all agents have to communicate through the "boss." Horizontal structures offer more flexibility but can get weighed down by communication overhead and emergent behaviors. For instance, research has shown that agents in horizontal architectures can spend 50% of their time giving orders to each other and exchanging niceties like saying "how are you?"

Perhaps this is proof that LLMs trained on vast quantities of conversational text will learn to mimic water cooler chat. While chit-chat is important for human bonding, it's likely just a waste of time and compute for machines.

### Comparison of Single Agents vs Multi-Agents

| | Single Agents | Multi-Agents |
|---|---|---|
| **Complexity** | Generally less complex, as they focus on individual decision-making and actions. | More complex, as they involve coordination, communication, and potential emergent behaviors among multiple agents. |
| **Scalability** | Limited scalability, as they are designed to handle specific tasks or environments. | Highly scalable, as they can distribute tasks and decision-making among multiple agents. |
| **Robustness** | Less robust, as the failure of the single agent can lead to system failure. | More robust, as the system can continue to function even if some agents fail. |
| **Flexibility** | Less flexible, as they are designed for specific tasks and environments. | More flexible, as they can adapt to changes in the environment or goals through coordination and reorganization. |
| **Communication** | No communication with other agents, but may interact with the environment or human users. | Requires communication and coordination mechanisms for agents to share information and collaborate. |

### Advantages and Disadvantages of Single Agents, Vertical Multi-Agents, and Horizontal Multi-Agents

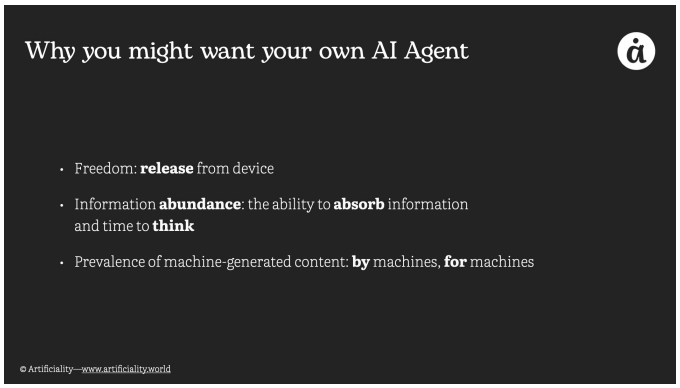
| | Single Agents | Vertical Multi-Agents | Horizontal Multi-Agents |
|---|---|---|---|
| **Advantages** | • Simpler architecture<br>• Easier to manage<br>• Faster response times | • Effective delegation<br>• Specialization<br>• Effective coordination | • Flexibility<br>• Parallel processing<br>• Fault-tolerance |
| **Disadvantages** | • Limited flexibility<br>• Limited adaptability<br>• Single point of failure | • Communication bottlenecks<br>• Cascading failures<br>• Limited adaptability | • Coordination complexity<br>• Coherance difficulty<br>• Potential conflict |

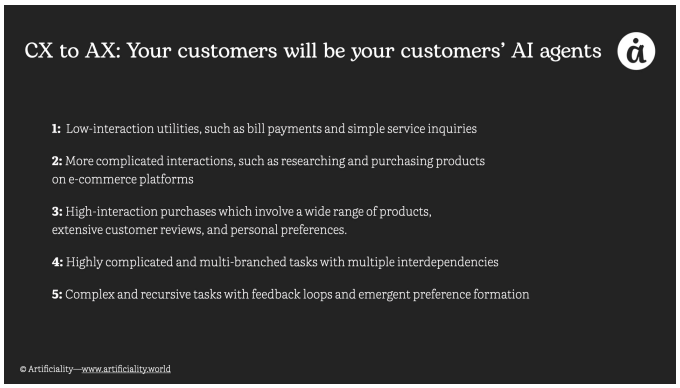
# CX to AX: Designing for Agents

What happens when your customers start to adopt AI agents to "get things done," including searching for new products, purchasing products, and interacting with customer service agents? Your customer service will no longer solely consider human customers. Your marketing messages will no longer solely focus on human reception. Even your SEO might no longer solely focus on Google Search but on the countless AI agents that each individual human uses to find things on the Agentic Web.

As AI agents become more sophisticated, they may replace human customers in a wide range of interactions. This shift will require companies to fundamentally rethink their approach to customer experience design—shifting from customer experience (CX) to agent experience (AX).

Why would we want AI agents to handle these interactions and experiences for us? First, agents are able to do things we might value: process vast amounts of information, make objective decisions, and provide highly personalized experiences based on comprehensive user data. Second, the future of the internet (what we call the Agentic Web) will be overwhelmed by AI-generated content that humans will not be able to process—it will only be readable by machine. That means we will need AI agents to "read" the internet for us since the internet will be made by machines, for machines. Third, agents promise freedom—freedom from the devices where they work for us.




The adoption of AI agents is likely to begin with low-interaction utilities, such as bill payments and simple service inquiries. These transactions often involve standardized processes and require minimal personal input, making them well-suited for automation. As AI agents demonstrate their effectiveness and reliability in handling these tasks, consumers may become more comfortable entrusting them with more complex interactions. Imagine an AI agent that you use to purchase products on Amazon. Gone are the days of sifting through reviews and wondering if you might have missed something that's important to you. An AI agent's capability to process and analyze vast amounts of data might be increasingly important as the quantity of comments and reviews increases, written by AI.

It's important to note here that we are unaware of authentication methods for AI agents that will be required for e-commerce companies, financial institutions, and regulators to approve of AI agents conducting transactions. But that gap is likely just a moment in time. As VeriSign's authentication services grew out of the need to secure website connections, services to authenticate AI agency will likely be developed too.

It's not possible to know how far this transition to agentic customers will go and over what time frame. But, no matter what, this future requires shifting focus from CS to AX. How might you design your company's external experience to appeal to AI agents that are acting on behalf of humans?

Designing for AX requires a fundamentally different approach than traditional CX design. Rather than treating interactions as linear, predictable exchanges of information, AX design must account for the complex, emergent dynamics that arise when your organization's agents interact with your customer's agents. This means designing interfaces and interactions that are not only intuitive and user-friendly for humans, but also for AI agents.

Designing for AI agents also means being prepared for unintended consequences and unexpected behaviors that may arise from agent-agent interactions. This requires building in safeguards, monitoring mechanisms, and governance structures that can detect and respond to emergent risks or harms, while also enabling beneficial forms of emergence and adaptation to occur. And this requires building entirely new safety mechanisms—for both your organization and your customers.

It's important to note that these design methods do not exist today. This is an important focus for Artificiality. We worry that the early and easy answers like oversight, override, transparency, explainability, accountability, while essential, will not be sufficient as AI is able to handle more complexity with more agency. And that is happening faster than anyone thought.

As a start, we offer a framework of seven design considerations, differentiated between a human (CX) and a machine (AX).

| | CX: Human | AX: Machine |
|---|---|---|
| **Information Processing** | • **Limited attention** span.<br>• Susceptible to **cognitive biases** (e.g., recency bias, confirmation bias), influenced by emotions and social factors.<br>• May choose a product based on a recent ad they saw, even if it's **not the best option** for their needs. | • Can process **vast amounts of information quickly**, objective and data-driven decision-making.<br>• Not influenced by emotions or **social factors.**<br>• Analyzes thousands of product reviews and specifications to determine the **best option** based on the user's needs and preferences. |
| **Personalization** | • Appreciates personalized experiences based on **past** behavior and preferences.<br>• May respond positively to **subtle cues and nudges.**<br>• Is more likely to purchase a product if it's recommended based on their **previous purchases.** | • Expects highly personalized experiences based on **comprehensive user data.**<br>• Requires **explicit and transparent** personalization.<br>• Expects product recommendations to be based on a comprehensive **analysis** of the user's data, including browsing history, purchase history, and explicitly stated preferences. |

| | CX: Human | AX: Machine |
|---|---|---|
| **Trust & Transparency** | • Builds trust through **positive experiences** and **brand reputation.**<br>• May not always understand or **question** underlying algorithms.<br>• Trusts a **well-known brand** and may not question how their recommendations are generated. | • Requires clear explanations of **how** recommendations are generated.<br>• Demands **transparency** in data usage and decision-making processes.<br>• Requires a **detailed explanation** of the factors considered in generating a recommendation and how the user's data is being utilized. |
| **User Interface** | • Responds to **visually appealing and intuitive interfaces.**<br>• May overlook **minor usability** issues.<br>• Is more likely to engage with a website that has an attractive layout and **easy navigation.** | • Prioritizes **efficiency and functionality** over aesthetics.<br>• Expects **seamless integration** with other AI systems and data sources.<br>• Prioritizes a **streamlined interface** that allows for quick data input and retrieval, and seamless integration with other relevant AI systems. |
| **Privacy & Security** | • Concerned about **personal** data privacy.<br>• Expects **secure** transactions and data handling.<br>• **Expects** their credit card information to be securely processed and **stored** when making an online purchase. | • Requires **strict adherence** to privacy regulations and data protection standards.<br>• Expects **advanced security** measures to prevent unauthorized access or manipulation.<br>• **Requires** all data exchanges to be encrypted and adhere to the latest privacy regulations, with robust security measures in place to prevent data breaches or unauthorized access. |
| **Feedback & Improvement** | • **Provides feedback** through ratings, reviews, and customer support interactions.<br>• **Adapts slowly** to changes in preferences or needs<br>• Leaves a product review and rating based on their experience, which **slowly influences** the product's overall rating and future development. | • **Continuously learns and adapts** based on real-time data and interactions.<br>• **Requires dynamic and responsive systems** that can quickly incorporate feedback.<br>• **Continuously feeds real-time data** on user interactions and preferences back into the system, allowing for rapid adaptation and improvement of the online experience. |
| **Ethical Considerations** | • May be influenced by **social norms and ethical considerations.**<br>• Expects companies to **adhere** to ethical practices.<br>• **May avoid purchasing** from a company known for unethical labor practices or environmental damage. | • Operates based on **predefined ethical guidelines and constraints.**<br>• Requires **clear definition and enforcement** of ethical boundaries in AI decision-making.<br>• **Makes decisions within predefined ethical boundaries,** such as avoiding products or services that violate human rights or environmental standards. |

# About Artificiality

***Extending Minds Beyond***

Artificiality is dedicated to unraveling AI's impact on individuals, organizations, and society, blending expertise in fields ranging from cognitive science and complexity theory to philosophy and design. As artificial philosophers and meta-researchers, we aim to make the philosophical more practical and the practical more philosophical. Our hope is to extend human minds beyond our current experience through the collective intelligence of humans and machines.

We don't endorse the utopian AI rhetoric. Yes, we believe that AI may have a positive impact on humanity. But our excitement is balanced by our fear of Big Tech's fantasy to make machines that can replace us. We strive to slow the frantic pace of debates around AI, down-regulating the noise so you can see stories in context. We push and pull on the assumptions that drive hype about the adoption of AI. And we ask questions about how AI changes knowledge, truth, belief, creativity, meaning, authenticity, and the overall human experience.

At Artificiality, we believe in a new vision for human-machine collaboration in which AI serves as a Mind for our Minds, amplifying our creativity, agency, and wisdom. As AI systems emerge with the capability to perceive, reason, and act on their own, we must approach their development with a deep understanding of the human experience. Our mission is to ensure that as we give machines more agency, we design AI minds to work for our human minds, enhancing our humanity rather than diminishing it.

To further our mission, we offer a range of services and resources. Our research publication cuts through the AI hype cycle, offering nuanced insights that dig deep into the current state and future possibilities of human-machine collaboration. We discuss the science of humans and machines in plain English. And we share aspirational ideas along with, at times, uncomfortably honest perspectives on AI's limitations and the scenarios that should concern humanity.

Our strategic advisory services help organizations amplify their competitiveness by providing thought leadership, frameworks, and best practices that challenge mainstream narratives. We offer change management programs to guide organizations through AI-driven complexity, embracing the uncertainties and emergent behaviors inherent in human-machine systems. And our educational programs empower workforces to collaborate with AI systems in ways that remain meaningfully human.

Join us on this wayfinding journey through the complexity of minds meeting machines. Subscribe, explore our services, or contact us to learn more about how we can help you collaborate effectively with AI. With careful consideration and a dash of creativity, the future may be human-centered yet.

### Advisory Services

In the AI age, organizations face a daunting challenge: how to harness the potential of generative AI while navigating the complexities of human-machine collaboration. At Artificiality, we empower leaders to embrace this challenge as an opportunity—an opportunity to reimagine the relationship between technology and humanity.

Our comprehensive suite of services guides you through every stage of your AI journey:

Amplify Your Competitiveness

- Stay ahead with cutting-edge AI research and unconventional thought leadership
- Identify and capitalize on emerging AI-driven opportunities
- Leverage generative AI to innovate with new products and services
- Mitigate threats from AI disruption to protect your market position

Build Your AI Capabilities

- Cultivate AI skills and machine intuition that enhance human judgment
- Foster an AI-empowered culture aligned with your organization's values
- Establish cross-functional AI centers of excellence for expertise-sharing
- Attract and upskill top AI talent to drive your initiatives

Manage Complex Change

- Implement complex change methods for AI-driven transformation
- Develop strategies to adapt to the emergent dynamics of human-AI collaboration
- Manage cultural and ethical challenges of successful AI adoption
- Build stakeholder trust through AI communication strategies

At Artificiality, we believe that the key to unlocking the full potential of generative AI lies not in the technology itself, but in the human creativity, agency, and wisdom that guide its development and deployment. By designing AI systems that serve as a Mind for our Minds—amplifying our ability to learn, grow, and make meaning in the world—we can create a future where technology is a catalyst for human flourishing.

Contact us today to learn how Artificiality can help you navigate the challenges and opportunities of the AI age with confidence and creativity. Together, let's build a future where the collective intelligence of humans and machines creates a world that extends our minds beyond our current experience.

## Who We Are

Helen and Dave Edwards are a husband-and-wife team of technology executives and AI pioneers who founded Artificiality. Their expertise blends insights from fields as diverse as cognitive science, complexity theory, philosophy, and design, which they have applied in the AI space since 2012. In 2017, they sold their first AI market research firm, Intelligentsia.ai, to Atlantic Media, continuing their work at Atlantic Media's subsidiary Quartz.

At Artificiality, Helen combines decades of experience innovating across major industries with a superpower for identifying the next emergent scientific breakthrough that will impact our complex world of humans and machines. She previously co-founded Intelligentsia.ai (which Atlantic Media acquired) and worked at Fonterra, Meridian Energy, Pacific Gas & Electric, Quartz, and Transpower NZ.

At Artificiality, Dave combines decades of experience distilling and advancing big technology trends with a superpower for understanding how technology, design, and capital will shape our future. He previously co-founded Intelligentsia.ai (which Atlantic Media acquired) and worked at Apple, CRV, Macromedia, Morgan Stanley, Quartz, and ThinkEquity.

Helen and Dave are co-authors of *Make Better Decisions: How to Improve Your Decision-Making in the Digital Age* and the upcoming *Mind for our Minds: A Human-Centered Design Philosophy for AI* and *Amplify: A Guide to the Complexity of Human-Machine Collaboration.*