Agentic AI

From Autonomous Agents to Enterprise Agentic AI Systems

Mahei Manhai Li, Philipp Reinhard, Jan Marco Leimeister

Business & Information Systems Engineering (2026)

Appendix (available online via http://link.springer.com)

Table 1 Comparison of our capability-based conceptualization of agentic AI compared to existing literature streams

	Agents and MAS	**Agentic IS**	**AI Agents and Agentic AI**	**Agentic AI Systems***
Core Sources	e.g., Jennings and Wooldridge 1996; Wooldridge and Jennings 1995	e.g., Baird and Maruping 2021; Russell 2019	e.g., Acharya et al. 2025; Sapkota et al. 2025; Schneider 2025; Botti 2025; Bandi et al. 2025	**This study …*
Agentic AI	Autonomous agents as a computational paradigm, spanning individual agents that act and reason independently and societies of agents (MAS) that cooperate or compete toward shared goals.	Agentic IS refers to a class of IS that can autonomously learn, adapt, and act on behalf of humans, taking on delegated rights and responsibilities and knowing when to act without being explicitly prompted.	A multi-agent AI class of systems or paradigm in which constellations of AI agents combine rule-based automation with generative models, use reasoning, planning, tools, and memory to set subgoals and take multi-step actions toward user objectives with limited supervision.	***Agentic AI*** is conceptualized as a set of ***capabilities*** (incl. reasoning, tool use, memory, and autonomous action) that characterize a ***new class of systems*** capable of operating across ***enterprise system landscapes*** by integrating and coordinating with heterogeneous tools, such as APIs and software systems (e.g., ERP, CRM, RPA, or other AI agents).
AI agents	An agent is a computer-based entity situated in an environment that perceives relevant information, decides autonomously how to act based on its design objectives, and then acts on the environment.	An agentic IS artifact is a rational, software-based agent embedded in an IS that can perceive and act autonomously, assuming specific rights to execute tasks and responsibilities to achieve preferred outcomes on behalf of human stakeholders.	An AI agent is an autonomous software program that performs specific, often narrowly scoped tasks within a larger system, serving as a building block of agentic AI, but by itself not encompassing the full breadth of agentic AI, as some definitions even exclude "AI agents" from what counts as agentic AI.	An AI agent, as ***first-order agentic AI***, is an autonomous software entity with six core capabilities (*goals, environmental interaction, tools, reasoning, actions, and memory*) that observes and learns from its environment and independently decides and executes actions. Such agents can connect to other systems, learn and use tools, perform multiple tasks, and operate alone or with other agents.
Multi-agents	A MAS is a society of agents: multiple autonomous, goal-directed agents in a shared environment that interact and coordinate to solve complex tasks no individual agent could handle alone.	Agentic IS systems evolve toward complex socio-technical configurations in which multiple agentic IS artifacts and human actors dynamically delegate, re-delegate, and coordinate tasks, moving from dyadic to triadic and multi-agent constellations.	A MAS is often how agentic AI is conceptualized, systems of multiple specialized autonomous agents collaborating on complex goals, with some authors reducing the multi-agent aspect to an architectural pattern.	An agentic MAS, as ***second-order agentic AI***, is a configuration of interacting agents in which ***collaboration*** enables multiple autonomous AI agents (and potentially other systems or human actors) to function as a coherent system pursuing shared or distributed goals, with at least two agents exhibiting first-order agentic capabilities.

Table 2 Comparison of Agentic AI Core Capabilities across literature streams

	Agents and MAS	**Agentic IS**	**AI Agents and Agentic AI**	**Agentic AI Systems***
Core Sources	e.g., Jennings and Wooldridge 1996; Wooldridge and Jennings 1995	e.g., Baird and Maruping 2021; Russell 2019	e.g., Acharya et al. 2025; Sapkota et al. 2025; Schneider 2025; Botti 2025; Bandi et al. 2025	*This study …
Goals	Agents' goals are the objectives that guide their autonomous, goal-directed behavior, enabling them to solve assigned tasks under given constraints such as time, quality, or priority.	For agentic IS, goals are the desired outcomes set by human delegators, often expressed as open-ended, ambiguous tasks that the system must interpret, coordinate, and act on across interconnected artifacts.	Goals are explicit, often complex objectives that guide planning and action in dynamic environments, and are shared or negotiated targets that multiple agents coordinate or compete around.	Goals are complex, open-ended objectives, covering tasks and roles, that individual agents pursue autonomously, can share or divide among multiple agents, and that remain shaped and constrained by human stakeholders, enterprise context, and broader organizational or social aims.
Environ-mental Interaction	Surrounding context in which agents are situated, the external world they sense and act upon, providing the information they use to decide what to do next.	Dynamic, unstructured, and uncertain context, often spanning heterogeneous "things" and infrastructures across locations, in which agentic IS artifacts are situated.	Dynamic, often partially observable world that agents are embedded in, perceived via sensors or APIs, represented through internal "world models," and continuously responded to as agents adapt their actions to changing conditions and to one another in a shared space.	Dynamic, often complex physical, digital, or socio-technical conditions, including *enterprise systems*, *other agents*, and *humans*, that both constrain and enable agentic AI, providing the external space in which agents perceive, decide, act, and adapt - distinct from their internally represented context (i.e. *situated context*).
Memory	*Understood as an *agent's controllable internal state,* and, in multi-agent systems, shared states (i.e., past perceptions, intentions, and decisions).	*Understood as evolving *internal models*, it reflects how agentic IS artifacts continuously update and refine their internal representations by observing human users and other artifacts.	Memory stores past interactions and context via episodic/semantic stores, vector memories, or internal models, enabling agents to adapt and improve future decisions.	Memory (both *short-term* and *long-term*) maintains *situated context*, shaping perception and reasoning so new situations are interpreted through past experience; *beyond bounded LLM context windows*, agentic AI uses buffers and *persistent stores*.

Reasoning	*Internal decision process by which an agent chooses actions based on its goals, perceptions, and internal state (*model agnostic*).	*Captured through decision models that guide how agentic IS artifacts appraise situations, optimize choices, and adapt their behavior over time (*model-agnostic*).	Multi-step deliberation that plans and decomposes complex tasks and iterates through reason–act–observe loops with feedback, increasingly powered by foundation and large language models that let agents adapt strategies dynamically.	Reasoning is the core mechanism that *breaks complex goals* and enables adaptation to dynamic environments through iterative planning and decision-making. *Foundation and large language models* drive this process by helping agents *select tools*, *sequence and adjust actions* based on *context* and *memory*, and *integrate with rule-based or other ML components.*
Tools	*Understood as the external resources and interfaces an agent uses to sense and act on its environment, such as sensors, computing resources, system calls, communication protocols, and agent-communication languages that enable an agent to interact with other agents and humans.	*Capabilities such as awareness capabilities that situate them in their environment, computational capabilities that let them act flexibly and autonomously, and interfacing capabilities that enable social interaction with other systems and humans.	Tools are external systems and interfaces, such as APIs, services, databases, actuators, sensors, that agents call or control to perceive and change their environment, forming the bridge from internal reasoning and planning to real-world effects.	Tools are external modules, APIs, applications, databases, software functions, and *other agents*, that extend what agents can perceive and do. *Tool learning* enables agents to learn to select, parameterize, and sequence these tools (and agents), integrating heterogeneous enterprise systems via standardized (e.g., MCP, A2A), often *natural-language interfaces*.
Actions	The operations, physical or communicative, that agents perform to change the environment.	*The concrete units of delegation - the task executions that must be coordinated, monitored, and, when needed, redelegated across human and artificial agents.	Actions are autonomous, goal-directed operations, physical, virtual, or purely computational, that interact with the environment, driven by planning, reasoning, and tool use.	Actions *are autonomous, goal-directed operations* (perceptions or executions) that *affect the environment*, such as updating CRM or ERP records or generating and sending reports or e-mails, arising from an agent's *orchestration of tools* that provide concrete action affordances.

Note: * capabilities being implicitly discussed and often on a higher level