Generative AI and Agentic Systems: Driving Automation and Transforming Operations

Nasif Chowdhury *

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Article

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Nasif Chowdhury

Department of Textile Engineering, Anwer Khan Modern University, Dhaka, Bangladesh; nafistextile@gmail.com

Abstract

It is believed that generative AI and agentic are two complementary concepts that are driving the automation and re-engineering of operations in any industry. Generative AI is the best at producing content, whether in the form of text, images, or code, in response to user inputs, whereas agentic systems take this ability and run everything independently and purposefully. This article discusses how the concept of reactively creating content began to change into proactively performing work. It characterizes both paradigms, discusses their technological enablers, such as LLMs, integration models, and orchestration of agents, and explains how agentic AI can be used to automate workflows, make decisions, and reinvent processes. We include case studies in different industries, analyse pros and cons, and write about architectural patterns like the agentic AI mesh item. We conclude with a description of challenging issues and future directions of research.

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1. Introduction

The concept of artificial intelligence (AI) still trends through contemporary enterprise. Even though artificial intelligence generative (gen AI)-based on large language models (LLMs) and diffusion models is game-changing in content generation, it lacks autonomy in its operations due to its reactive character. Conversely, agentic systems are those systems which can perform, by themselves, and in multiple steps, tasks with the minimum human influence, in effect acting upon what happens internally, and then performing it externally (Thomson Reuters, McKinsey & Salesforce, 2022).

The early applications of generative AI were, as McKinsey put it, horizontal, productivity-enhancing applications (e.g., copilots), with limited scalability, whereas agentic AI is seen as the new frontier: enhancing or introducing autonomy, planning, and orchestration into enterprise workflows, McKinsey & CompanyTechRadar. This evolution includes the contribution of multi-agent cooperation, storage structures, and levels of explanation that advance AI beyond reactive support to proactive functioning.

2. Defining Generative AI and Agentic Systems

2.1. Generative AI

Generative AI is an AI models that happen to create new work (text, image, code) based upon some prompt. It is characterised by being reactive: the user enters a query, and the model prepares an appropriate response.

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2.2. Agentic Systems

Alternatively, agentic AI is autonomous. This paradigm can be seen in systems capable of planning, acting, adapting and executing with respect to goals on their own. These do not follow single prompt responses and are coordinated procedures that execute multi-step functions, Amazon Web Services, Inc. They use LLMs to think, but combine and integrate memory, orchestration, using tools, and persistent context.

The author describes it thus: generative AI responds by doing input, and produces output; agentic AI takes the form of a multistep activity accomplished independently toward an objective; Thomson Reuters.

3. The Technical Principles Behind Agentic Automation

There are several technologies that lie behind the emergence of the agentic system:

Large Language Models (LLMs) can perform reasoning, planning and language tasks.

The frameworks and multi-agent systems also allow multi-agent systems to decompose tasks and memory, as well as obtain collaboration, McKinsey & CompanyarXiv+1.

Interaction with applications and tools using LLM is standardised through integration protocols (e.g., the Model Context Protocol by Anthropic).

Composability, scalability, and governance. McKinsey proposed an agentic AI mesh, a dynamic type of orchestration architecture, to support composability, scalability, and governance McKinsey & TechRadar, 2024).

4. Automation Capabilities and Operational Impact

Agentic The agentic systems are popularised to introduce the change to operations in several dimensions:

Workflow Automation: It can process unstructured tasks with document drafting, scheduling and support processes.

Decision-Making and Optimization: An autonomous agent is able to make investment balance, logistics optimization, and rerouting decisions.

Human-AI Co-operation: These systems do the routine work and increase human strategic functions, acting as co-pilots.

Vertical Integration: Underlying some individual business processes horizontally, such as supply chain integration, clinical integration, and agentic AI, goes beyond horizontal productivity improvements, McKinsey & TechRadar (2023).

5. Benefits of Generative and Agentic Automation

There are several advantages of using agentic systems:

Scalability: Managing complex processes, even in the presence of humans, does not require the growth of human resources.

Cost Efficiency: minimise labour costs, maximise throughput.

Speed and Agility: Reaction to any changing condition.

Consistency: Eliminate human error when regulating processes.

Strategic Focus: empower people to do more prominent overseeing and creative tasks.

6. Challenges and Risks

The concerns involved in agentic deployment are:

Trust and Reliability: Risk of hallucinations or biased decision-making, IT ProFinancial Times+1.

Security Vulnerabilities: A Data breach is a vulnerability or potential exploitation that can be performed by autonomous agents, TechRadarIT Pro.

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Governance and Compliance: There are legal and ethical issues to consider, particularly in regulated industries, Financial TimesTechRadar.

Obstacles to Adoption: Obstacles to adoption are that many projects are stuck in pilot stages because they are too complex in terms of technology and misaligned with the internal organisational needs. InvestorsTechRadar.

Resource Consumption: AP News. The high-computation demands can undermine its sustainability objectives.

7. Case Studies and Adoption Trends

Legal Industry: AI robots in the legal process can provide efficiency, yet must be checked by a human employee because of the threats of hallucination, Financial Times.

Workforce Agents: The experiment of organising teams of oppressed roles, called agentic teammates, is being conducted by numerous organisations in the UK, where the testability of more economic productivity of PS4.5 trillion is accepted by The Times.

Increased Productivity: AI agents, which aid in coding, quality assurance, and project completion, enhanced the productivity of developers by as much as 30% (The Times of India, 2024).

Enterprise Evolution: A transition toward autopilot systems reduces control but maximises governance and integration (Financial Times, 2023).

Research Insights: Academic surveys have frameworks, a taxonomy, structure, and agentic systems.

8. Future Directions

Autonomous Enterprises: The autonomous enterprises have most of their operations managed agentically.

Multi-Actor Teamwork: Swarms are distributed and coordinate a task.

Standardised Procedures: Employing an MCP-like pattern to integrate the tools.

Ethical Governance: AI supervisory functions, responsibilities, and trust arrangements.

Sustainable AI: services to balance between energy consumption and agentic computational needs.

9. Conclusion

Generative AI and agents are the complementary halves of how AI is transforming the mode of enterprise operations. Generative models feed reactive behavioural content production, compared to agentic systems, which support proactive autonomy. The combination of these allows scalable automation, operational resiliency, and strategic innovation. But to achieve this transformation, challenges of trust, governance, integration and sustainability must be overcome. In the 2025s and beyond, agentic AI will mark a new phase of business intelligence - systems that act, evolve, and optimise their actions independent of human direction.

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