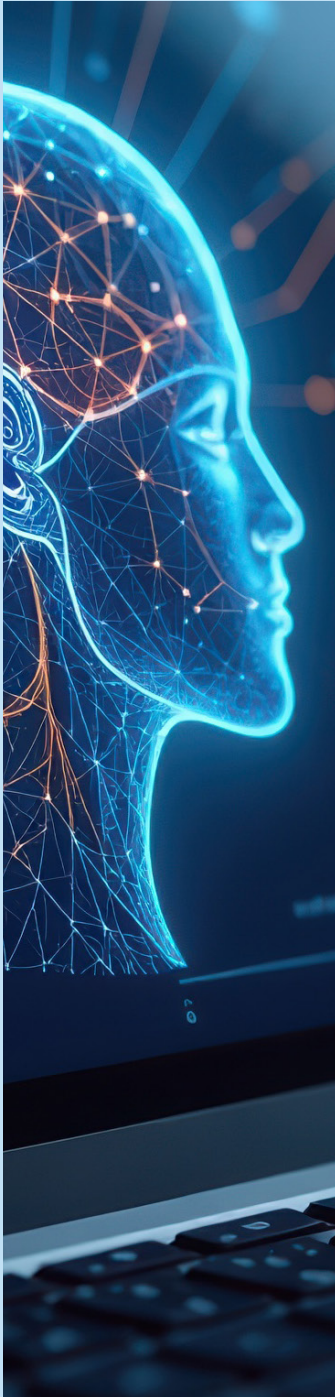




AGENTIC AI: THE RISE OF AUTONOMOUS INTELLIGENCE AND ITS TRANSFORMATIVE POTENTIAL

Introduction: Defining Agentic AI and its Emergence

The field of Artificial Intelligence has undergone a remarkable evolution, transitioning from rigid, rule-based systems to sophisticated machine learning models capable of complex pattern recognition. However, the need for AI that can operate autonomously, perceive, and reason in dynamic environments, and pursue defined goals has driven the emergence of Agentic AI. Agentic AI is defined by its core characteristics: autonomy, goal-directed behaviour, adaptability, and the ability to interact with and modify its environment. It distinguishes itself from traditional AI by its proactive nature, moving beyond reactive responses to

independent, intelligent action. The recent surge in Agentic AI’s development is largely attributable to advancements in large language models, deep learning, and the increasing availability of computational power, along with the proliferation of powerful APIs that allow these systems to utilize external tools. This white paper aims to provide a comprehensive overview of Agentic AI, exploring its foundational principles, architectural frameworks, key capabilities like planning and adaptive learning, real-world applications, and the ethical considerations surrounding its deployment.

According to Gartner, by 2028, 33% of enterprise software applications will include agentic AI, up from less than 1% in 2024. Over 80% of enterprises will use AI Agents and Agentic Workflow for Data Management and Fabrics.

The Evolution of Intelligent Systems

We moved from manual, error-prone legacy systems to rule-based automation, increasing efficiency but limiting flexibility. The integration of traditional AI and LLMs added intelligence and understanding, enabling more complex interactions and basic reasoning. Agentic AI represents the culmination, with autonomous systems using LLMs and tools to perceive, plan, and act, achieving complex tasks and creating dynamic workflows.

Stage	Definition	Characteristics	Example (Product Inquiry)	Limitations
 Legacy System	Manual, non-automated processes	Human-driven, paper-based, or basic digital records	Customer calls; staff manually checks inventory, answers questions from a printed catalog	Slow, prone to errors, limited information access, requires human interaction
 Automation	Streamlines repetitive tasks with predefined sequences	Automated actions, pre-programmed instructions, handles structured data	Automatically sends an email with product details after a customer fills out an inquiry form	Still requires manual programming, limited adaptability, cannot derive solutions or handle nuanced queries
 Automation & Traditional AI/ML	Combines automation with machine learning for enhanced capabilities	Predictive models, pattern recognition, basic natural language processing	AI-powered chatbot provides basic product information, suggests related products based on past purchases, and routes complex queries to human agents	Limited understanding of context, difficulty in handling complex or ambiguous queries, cannot create new workflows
 Generative AI - Large Language Model	Uses large language models for advanced natural language understanding and generation	Contextual understanding, generates human-like responses, can perform basic reasoning	LLM-powered chatbot answers product inquiries with detailed, context-aware responses, provides personalized recommendations, and can summarize reviews	May generate inaccurate information, limited action execution, still needs human supervision for complex tasks
 Agentic AI	Autonomous system that perceives, plans, and executes actions using LLMs and tools	Self-directed, adaptive, handles complex tasks, uses tools and APIs to interact with the world	Agentic AI analyzes the product inquiry, checks real-time inventory and pricing, generates a personalized response, uses an API to place an order if requested, and learns from each interaction to improve future responses and optimize the sales process	Ethical concerns, complexity of development, requires robust testing, can create complex workflows and use tools to achieve them

Figure 1: Evolution of Intelligent Systems

Core Principles and Architectural Frameworks of Autonomous Agents

Foundational Principles and Components of Agentic AI

Agentic AI represents a significant evolution in artificial intelligence, characterized by its ability to operate independently and adapt dynamically to its environment. Here are foundational principles and characteristics of Agentic AI.

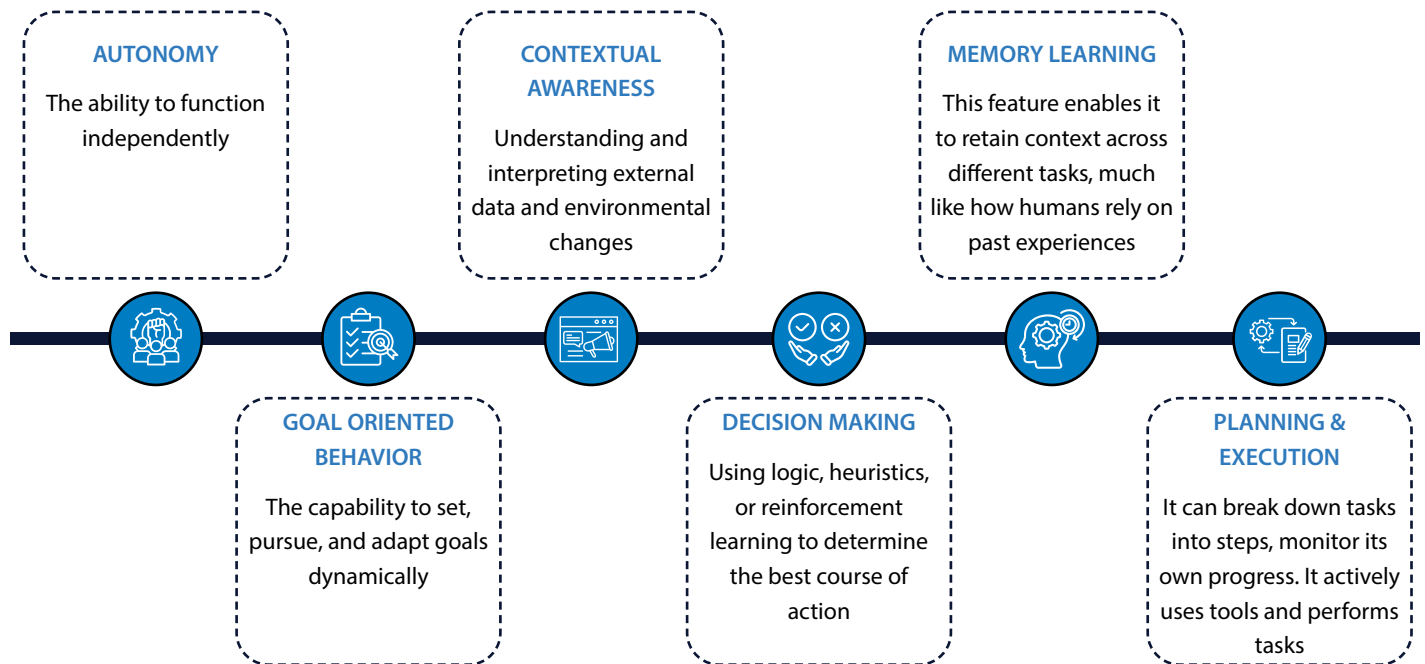


Figure 2: Foundational Principle of Agentic AI

Architectural Components of Agentic Systems

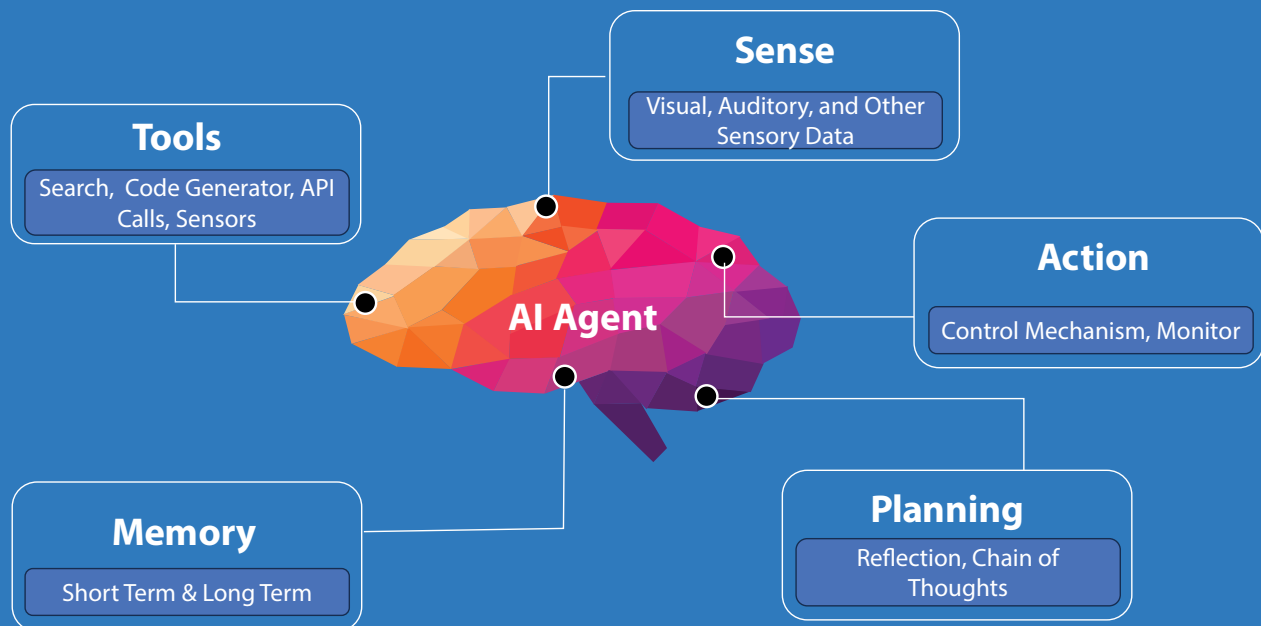


Figure 3: Key Components of Agentic AI

	 Sense	 Plan	 Action	 Learn	 Automate
Define	Agent's ability to understand the meaning of the environment, including social cues, implicit information, and dynamic relationships	Instead of just planning for pre-defined goals, agents can generate and modify their objectives based on evolving circumstances and learned preferences	It's about an agent's ability to react to unforeseen events in real-time, exhibiting a form of "cognitive reflex"	Agent's ability to assess its own knowledge and uncertainty, and to actively seek out information to improve its understanding	Agent's ability to operate within complex social and collaborative environments, understanding and managing relationships with other agents and humans
Concepts	Agents develop a "situational model" that includes not just data, but also inferred intentions, potential consequences, and historical context	Agents possess a "goal refinement engine" that continuously evaluates and adjusts goals, balancing immediate needs with long-term objectives	The agent has a "reactive core" that operates in parallel with its deliberative processes, enabling rapid responses to critical situations	Agents have an "epistemic awareness module" that monitors its confidence levels and triggers information-gathering processes when needed	Agents develop a "relational model" that represents the dynamics of interactions, including trust, influence, and shared goals
Realize	This is not fully solved by LLMs, because it requires the agent to understand the world, and not just language	This includes the ability of the agent to create sub goals, and modify goals based on new information	This is similar to how a human can react to a ball being thrown at them, without consciously thinking about it	This allows the agent to understand what it does not know and take action to rectify that	This means the agent understands how to cooperate, negotiate, and even lead, when needed

Figure 4: Details of Agentic AI Components

For Agentic AI to function effectively in real-world scenarios, it must possess both cognitive sophistication and social intelligence. These building blocks provide the necessary framework to move beyond basic input-output systems and manage the complexities of dynamic environments.

Agentic AI systems, at their core, operate through a fundamental cycle of perception, cognition, and action. To achieve autonomous behavior, they are structured into three primary modules as per below diagram.

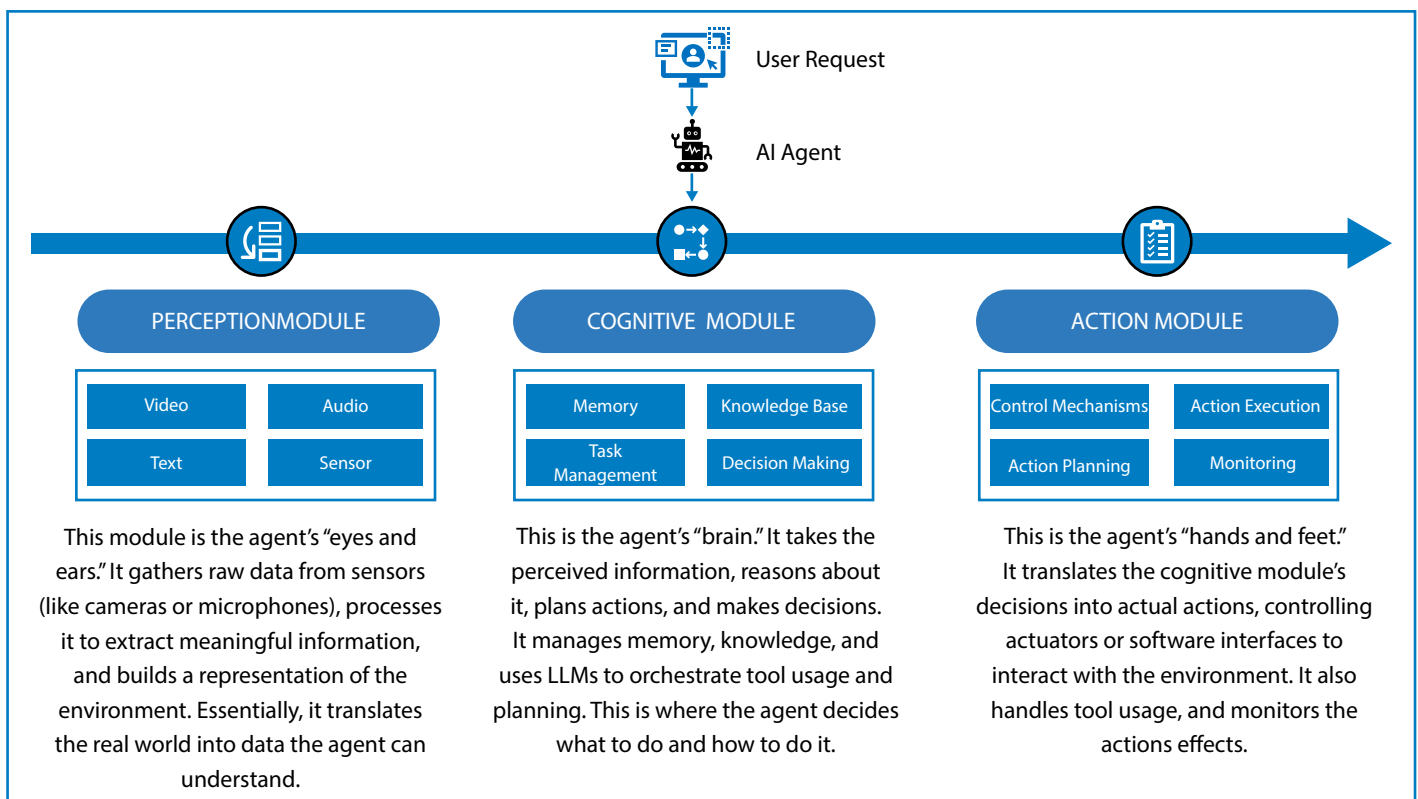


Figure 5: Primary Modules of Agentic AI

Agentic AI Architecture for Future Systems

Below diagram outline the layers of a Multi-Agentic AI system, detailing their sub-components and functionalities:

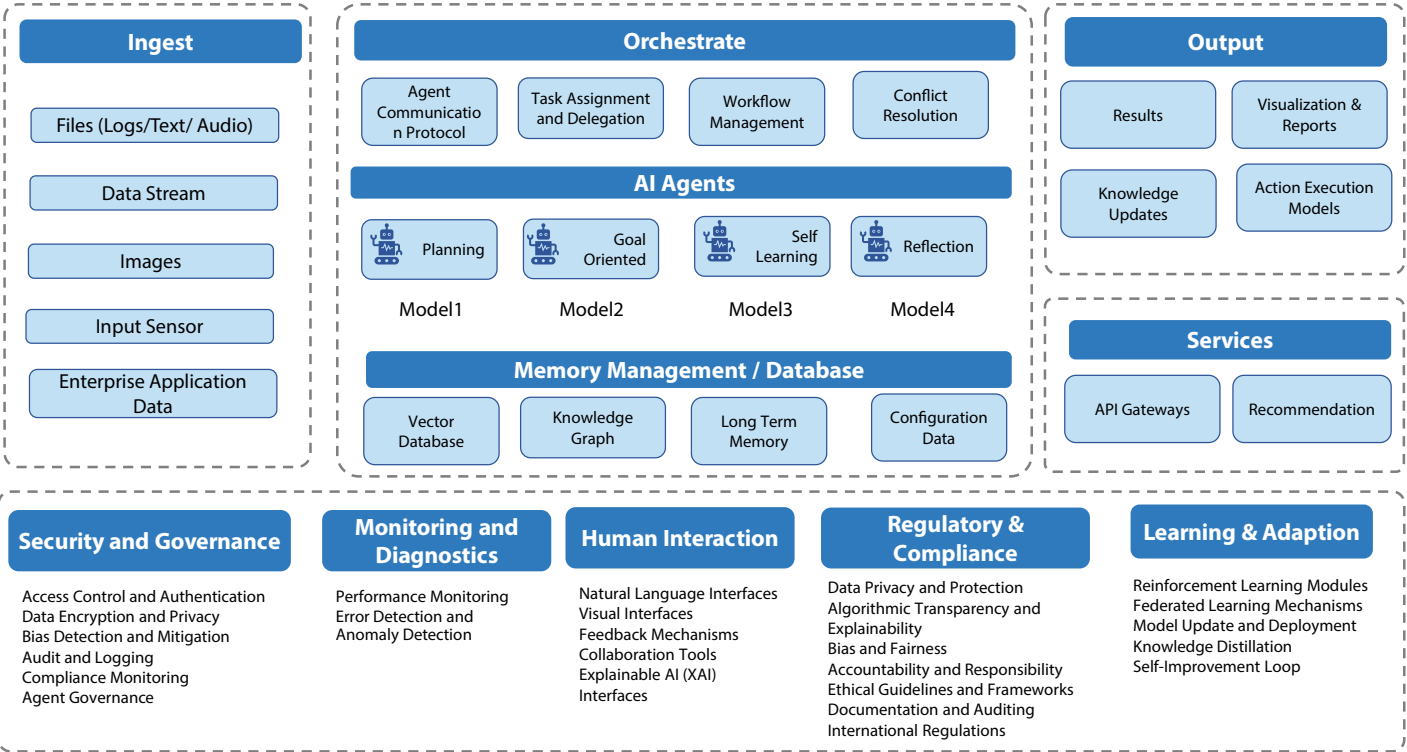


Figure 6: Reference Architecture of AI Agent

The Role of MCP (Model Context Protocols) in Agentic AI Architecture

MCP acts as a foundational communication layer that supports Agentic AI architectures. By standardizing context management and enabling seamless interaction between AI agents and external tools, MCP enhances the capabilities of Agentic AI systems. MCP includes elements like the MCP Host (AI model), MCP Client (intermediary service), and MCP Server (applications exposing capabilities), which work together to facilitate data flow and task execution.

The Role of Large Language Models (LLMs) in Agentic AI Architecture

LLMs are central to Agentic AI, acting as the cognitive core. They enable sophisticated planning, reasoning, and natural language interaction, allowing agents to understand context, manage knowledge, and utilize external tools. This drives the creation of more adaptable and human-like autonomous systems.



Below diagram illustrates Customer Support Portal for Product Inquiries, powered by a Multi-Agentic AI system, detailing each layer's construction and functionality.

	 Input Layer	 Orchestrate	 Action	 Database	 Service	 Output
Description	This layer gathers and processes customer inquiries from various channels	This layer manages the workflow and communication between AI agents to address customer inquiries	These specialized agents perform specific tasks using relevant tools and planning strategies	This layer stores and retrieves persistent data required by the AI agents	This layer connects AI agents to external services and systems	This layer formats and delivers the AI agents' responses to the customer
Construct	Text Input: Customer inquiries via chat interface, email, or support tickets Voice Input: Transcribed audio from phone calls using speech-to-text API Ingest: Real-time product inventory data from the inventory management system Database Query: Customer order history, shipping details, and product information from the CRM and product database Log Data: Accessing website logs for user activity, and previous support tickets	Inquiry Routing Agent: Analyzes the inquiry and routes it to the appropriate agent (e.g., availability agent, support agent) Context Manager: Maintains the conversation context and customer history Task Planner: Breaks down complex inquiries into sub-tasks and assigns them to agents Communication Hub: Facilitates communication between agents and resolves conflicts Workflow Engine: Manage the flow of information between agents	Availability Agent Tools: Inventory API, product database Planning: Extracts product name, checks inventory, and formulates a response Support Agent Tools: FAQ database, troubleshooting guides, knowledge base Planning: Analyze support issue, search for relevant information, and formulate response	Product Database: Contains product information (descriptions, prices, availability) Customer Database (CRM): Stores customer profiles, order history, and contact information Inventory Database: Real-time inventory levels FAQ and Knowledge Base: Stores support articles and troubleshooting guides Order Tracking Database: Stores shipping and delivery information	API Gateways: Manages access to inventory, shipping, and payment APIs Plugin Management: Allows the AI agents to use external tools Data Format Converters: Translates data between different formats Authentication and Authorization: Secures access to external services	Chat Interface: Displays responses in a conversational format Email Response: Sends detailed responses via email Voice Output: Text-to-speech for phone support API Output: Provides data to external systems or applications

Figure 7: Agentic AI for Customer Portal



Transformative Applications: Industry Use Cases and Real-World Impact

Agentic AI holds significant promise for advancing sustainability across various sectors. We can address complex environmental challenges with greater efficiency and effectiveness. Here is a breakdown of how agentic AI contributes to sustainability.

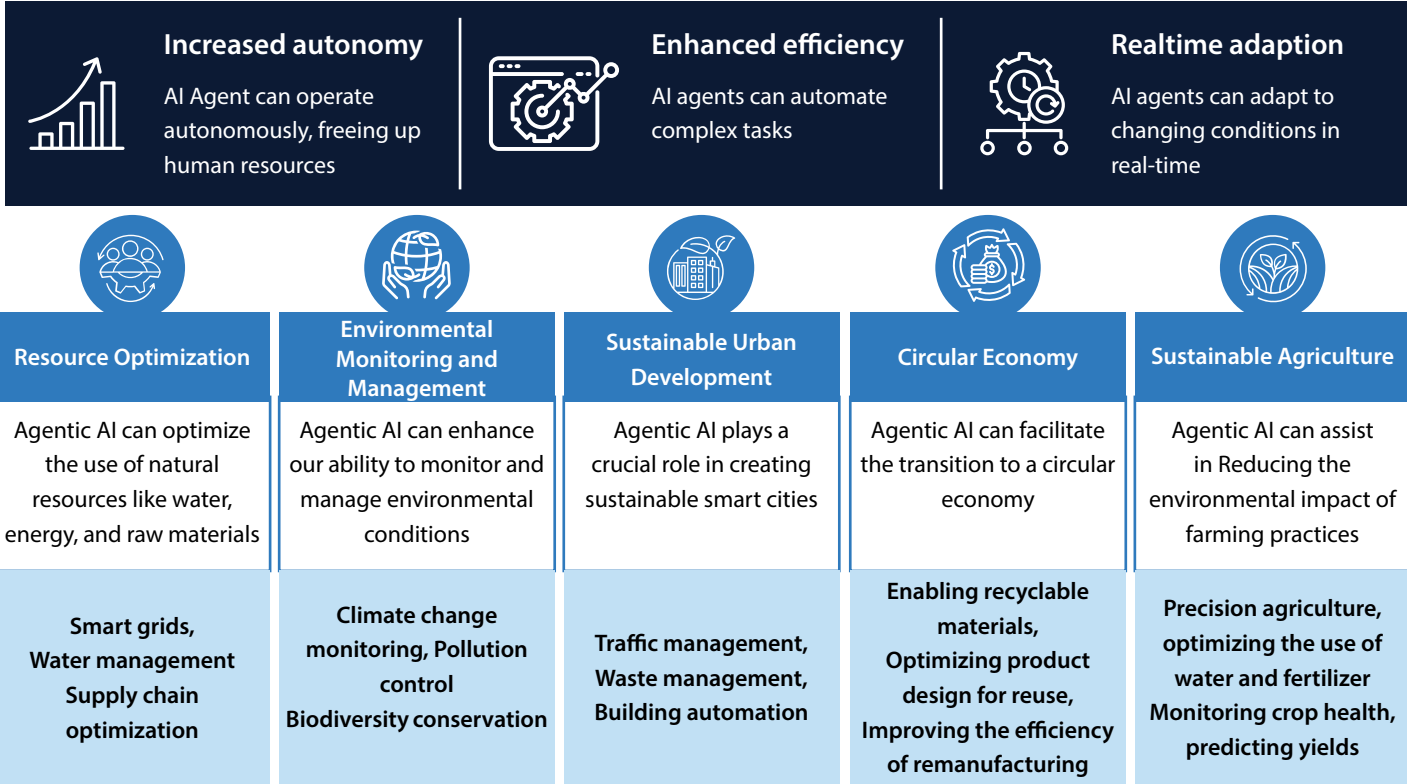


Figure 8: Agentic AI contribution to sustainability

By 2029, agentic AI will autonomously resolve 80% of common customer service issues without human intervention, leading to a 30% reduction in operational costs, according to Gartner, Inc.

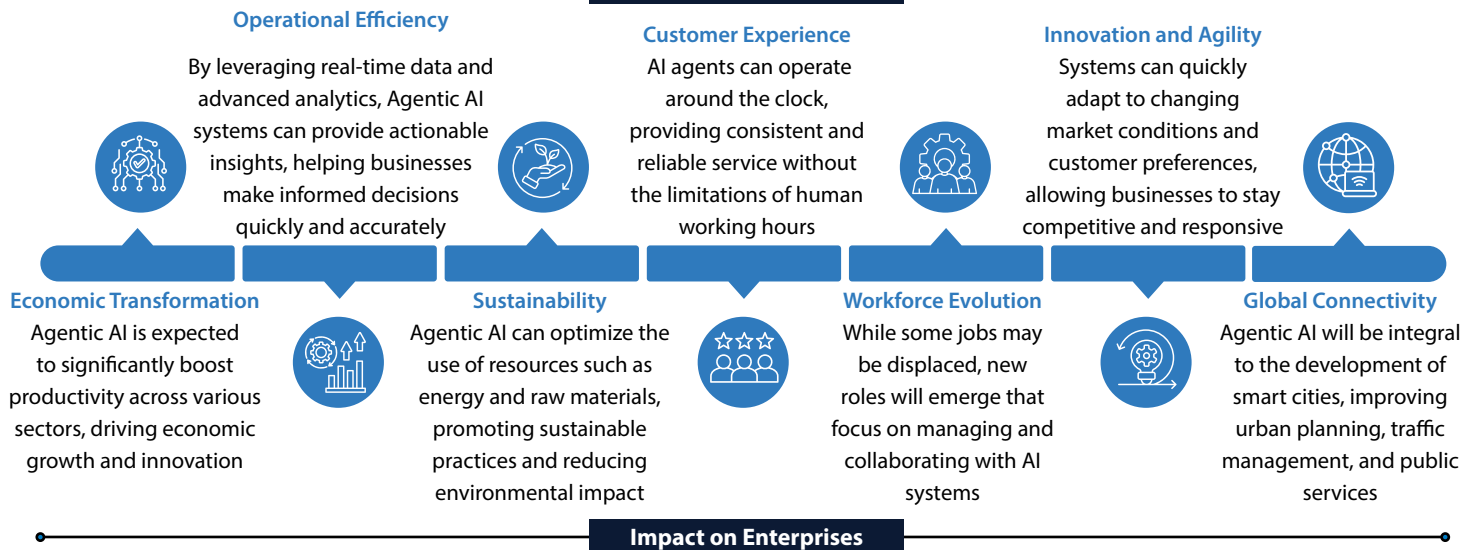
Industry Sector	Agentic AI Application	Real-World Impact
Customer Service and Support	Intelligent chatbots, virtual assistants, personalized support, proactive problem-solving	24/7 availability, improved customer satisfaction, faster issue resolution, reduced operational costs
Healthcare and Medical Diagnosis	Medical image analysis, drug discovery, personalized treatment plans, remote patient monitoring	Improved diagnostic accuracy, accelerated drug development, personalized patient care, enhanced preventative care
Finance and Investment	Algorithmic trading, risk management, fraud detection, financial analysis, portfolio management	Increased trading efficiency, reduced financial risk, enhanced fraud prevention, personalized financial advice
Supply Chain and Logistics	Optimized delivery routes, inventory management, demand prediction, autonomous warehousing, drone delivery	Reduced delivery times, minimized disruptions, optimized inventory levels, increased operational efficiency
Creative Industries and Content Generation	Automated content creation (articles, music, art), personalized content, code generation, software development assistance	Increased content production speed, personalized entertainment, accelerated software development, enhanced creative workflows
Scientific Research and Discovery	Autonomous experimentation, data analysis, drug discovery, materials science, climate modeling	Accelerated scientific discovery, automated complex research tasks, novel insights generation, improved research efficiency
Education and Personalized Learning	Personalized learning experiences, adaptive educational platforms, individualized feedback, student progress tracking	Tailored learning paths, improved student engagement, democratized access to quality education, enhanced educational outcomes

Figure 9: Industry Use cases with Impact

Future Directions of Agentic AI and its Long-Term Potential

This section delves into the exciting possibilities and potential future of Agentic AI, exploring its anticipated evolution and the profound implications it holds for society.

Future Potentials



Impact on Enterprises

The Way Forward

Agentic AI, driven by advanced language models & emerging communication framework like Model Context Protocol, is poised to transform industries like finance and healthcare through its autonomous reasoning and response capabilities. While challenges in scalability and ethics persist, its potential for business automation and collaborative intelligence is immense. Ongoing research promises increasingly sophisticated AI agents, enhancing efficiency and decision-making across diverse sectors, revolutionizing how we interact with technology.

References

1. [Why AI agents are the next frontier of generative AI | McKinsey](#)
2. [Gartner® Top Strategic Technology Trends for 2025: Agentic AI](#)
3. [Gartner Predicts Agentic AI Will Autonomously Resolve 80% of Common Customer Service Issues Without Human Intervention by 2029](#)

About the Author



Divyesh Lappawala, Senior Technology Architect at Infosys

Divyesh is a seasoned professional with 19 years of experience leading successful development, migration, and transformation projects. He possesses in-depth expertise in Microsoft 365 technologies, leveraging them to architect, design, develop, and implement impactful business applications. He is active member of different architecture communities. As a guardian of architectural integrity, Divyesh also provides strategic guidance to senior leadership on emerging technologies like AI and collaboration services, keeping the organization at the forefront of industry trends. Divyesh holds a Master's degree in Information Technology.

Infosys Topaz™ is an AI-first set of services, solutions and platforms using generative AI technologies. It amplifies the potential of humans, enterprises, and communities to create value. With a vast repository of AI assets, pre-trained AI models, 10+ AI platforms steered by AI-first specialists and data strategists, and a 'responsible by design' approach, Infosys Topaz™ helps enterprises accelerate growth, unlock efficiencies at scale and build connected ecosystems. Connect with us at infosystopaz@infosys.com.

For more information, contact askus@infosys.com

Infosys
Navigate your next

© 2026 Infosys Limited, Bengaluru, India. All Rights Reserved. Infosys believes the information in this document is accurate as of its publication date; such information is subject to change without notice. Infosys acknowledges the proprietary rights of other companies to the trademarks, product names and such other intellectual property rights mentioned in this document. Except as expressly permitted, neither this documentation nor any part of it may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, printing, photocopying, recording or otherwise, without the prior permission of Infosys Limited and/or any named intellectual property rights holders under this document.