Review

Not peer-reviewed version

# Comprehensive Review of Artificial General Intelligence AGI and Agentic GenAI: Applications in Business and Finance

Satyadhar Joshi *

Posted Date: 12 May 2025

doi: 10.20944/preprints202505.0846.v1

Keywords: Artificial General Intelligence; AGI; Artificial Intelligence; Machine Learning; finance; future of AI

*Review*

# Comprehensive Review of Artificial General Intelligence AGI and Agentic GenAI: Applications in Business and Finance

**Satyadhar Joshi**

Independent Researcher, Alumnus, International MBA, Bar-Ilan University, Israel; satyadhar.joshi@gmail.com

**Abstract:** This paper delves into the multifaceted realm of Artificial General Intelligence (AGI), exploring its definition, evolution, potential applications, and the ongoing debates surrounding its development. We examine AGI's theoretical underpinnings, contrasting it with narrow AI and artificial superintelligence (ASI). Furthermore, we discuss the impact of AGI across various sectors, including finance, research, and business, while also addressing the ethical considerations and challenges associated with its advancement. This survey synthesizes current research and perspectives, providing a comprehensive overview of AGI's trajectory and its potential to reshape the future. This paper presents a comprehensive examination of Artificial General Intelligence (AGI), analyzing its current state, applications across industries, and future trajectory. Through systematic review of academic literature and industry reports, we identify three critical dimensions of AGI development: (1) technical architectures bridging narrow AI to general intelligence, (2) transformative applications in finance and business, and (3) emerging ethical and workforce challenges. Our findings reveal accelerating market growth (projected 36.9% CAGR through 2031) alongside significant research gaps in evaluation metrics, environmental impact, and cross-cultural adoption. The study highlights AGI's dual role as both disruptor and enabler, with financial services emerging as the leading adoption sector (38% of investments by 2028). We summarize (based on cited work) a framework for responsible AGI development that balances innovation with ethical considerations, emphasizing the need for standardized benchmarks and workforce transition strategies. The paper contributes to ongoing discourse by synthesizing dispersed research into actionable insights for practitioners and policymakers navigating the AGI revolution. This is a pure review paper and all results and findings are form cited literature. This paper presents a comprehensive review of Artificial General Intelligence (AGI) and Agentic AI, examining their technological foundations, current capabilities, and future trajectories. The study identifies key technical distinctions between these AI paradigms, including their architectural requirements, computational demands, and learning mechanisms. We survey the current technical landscape, including specialized frameworks like OpenAI's AGI classification system and emerging Agentic AI platforms such as Vectara-agentic and CrewAI. The paper also examines the hardware infrastructure and cloud services enabling these advanced AI systems, from NVIDIA's specialized GPUs to large-scale projects like OpenAI's proposed "Stargate" initiative and others. Our comparative analysis reveals that Agentic AI is rapidly transitioning from research to practical deployment across industries including legal services, DevOps, and enterprise automation, while AGI remains in the research phase with ongoing debates about its feasibility and timeline. The paper discusses critical challenges in both domains, including safety considerations, alignment problems, and governance requirements. We highlight how Agentic AI serves as a bridge between today's generative AI capabilities and future AGI aspirations, offering autonomous functionality while avoiding some of AGI's unresolved risks.

**Keywords:** Artificial General Intelligence; AGI; Artificial Intelligence; Machine Learning; finance; future of AI

---

 doi:10.20944/preprints202505.0846.v1



## 1. Introduction

Artificial Intelligence (AI) has rapidly transformed numerous aspects of modern life, from automation to personalized recommendations. However, the current state of AI is largely characterized by narrow or weak AI, designed for specific tasks. The pursuit of Artificial General Intelligence (AGI), which aims to create AI with human-level cognitive abilities, remains a central goal in the field. This paper provides an overview of AGI, its potential, and the challenges in its development.

The concept of AGI has captured the imagination of researchers, technologists, and the public alike. AGI is envisioned as a system capable of understanding, learning, and applying knowledge across a wide range of domains, much like a human. This capability distinguishes it from narrow AI, which excels only in the tasks it is specifically programmed for. The realization of AGI promises to revolutionize industries, redefine human-machine interaction, and potentially address some of humanity's most pressing challenges. The field of artificial intelligence is undergoing rapid transformation, with two particularly significant developments capturing researchers' attention: the pursuit of Artificial General Intelligence (AGI) and the emergence of Agentic AI systems [1,2]. While AGI represents the long-standing goal of creating machines with human-level general intelligence [3], Agentic AI focuses on developing autonomous systems capable of complex decision-making within specific domains [4].

Recent advancements have reignited debates about the feasibility and timeline for achieving AGI. Some experts predict AGI could emerge as early as 2025 [5,6], while others remain skeptical, arguing that fundamental challenges remain unresolved [7,8]. Meanwhile, Agentic AI has gained traction as a practical approach to creating more autonomous and capable AI systems [9,10].

This paper examines the current state of both AGI and Agentic AI, their relationship, and their potential impacts on industry and society. Section II explores definitions and key concepts. Section III analyzes recent technological developments. Section IV discusses challenges and limitations. Section V examines applications and implications, and Section VI concludes with future directions.

Artificial General Intelligence (AGI) represents a paradigm shift in machine capabilities [11,12]. Unlike narrow AI systems, AGI aims to replicate human-level adaptability [13]. Recent estimates suggest the AGI market could grow at 36.9% CAGR [14].

Artificial General Intelligence (AGI) has emerged as a transformative technology with the potential to revolutionize numerous industries [15]. Unlike narrow AI systems designed for specific tasks, AGI aims to replicate human-level intelligence across multiple domains [16]. The concept of AGI has gained significant attention in recent years, with debates ranging from its technical feasibility to its societal impact [17].

Key works define AGI as systems demonstrating human-like reasoning across domains [15,18]. Current research focuses on overcoming technical barriers to generalized learning [19].

Recent advancements in machine learning and neural networks have accelerated progress toward AGI [12]. While some experts argue that AGI is already here in primitive forms [12], others maintain that true AGI remains years or decades away [20]. The financial sector has been particularly active in exploring AGI applications, recognizing its potential to transform market analysis, trading strategies, and risk management [21].

## 2. Introduction to Technical Concepts and Terminology

This section defines and explains more technical terms and concepts identified in the reviewed literature.

### *2.1. Definitions and Key Concepts*

#### 2.1.1. Artificial General Intelligence (AGI)

AGI refers to artificial intelligence systems that possess the ability to understand, learn, and apply knowledge across a wide range of tasks at a level comparable to human intelligence [3,22]. Unlike narrow AI systems designed for specific tasks, AGI would demonstrate flexible, general-purpose intelligence [23].

 doi:10.20944/preprints202505.0846.v1



The pursuit of AGI represents what some consider the "holy grail" of AI research [24]. However, significant debate persists about both the definition of AGI and the path to achieving it [25,26].

#### 2.1.2. Agentic AI

Agentic AI represents a paradigm shift from passive AI systems to autonomous agents capable of initiating actions, making decisions, and completing complex workflows without constant human supervision [2,27]. These systems go beyond generative AI capabilities by incorporating goal-directed behavior and functional autonomy [4,28].

Key characteristics of Agentic AI include:

- Autonomous decision-making capabilities [29]
- Ability to handle multi-step workflows [30]
- Capacity for self-improvement within defined parameters [31]
- Contextual understanding and adaptation [32]

### *2.2. Technical Concepts and Terminology*

1. **Artificial General Intelligence (AGI)**: Systems with human-level understanding and reasoning across diverse domains [3]. Characterized by:

$$C_{AGI} = \sum_{i=1}^{n} (T_i \times A_i) \tag{1}$$

   where $C_{AGI}$ represents general capability, $T_i$ is task performance, and $A_i$ is adaptation speed.
2. **Agentic AI**: Autonomous systems capable of goal-directed behavior and multi-step workflows [2]. Autonomous systems capable of goal-directed behavior and multi-step workflows [2]. Key components include function calling architectures, workflow orchestration engines, and reinforcement learning from human feedback (RLHF).
   Key components include:
   - Function calling architectures
   - Workflow orchestration engines
   - Reinforcement learning from human feedback (RLHF)
3. **Multi-Paradigmatic AI**: Hybrid approaches combining neural networks with symbolic reasoning [33]. Expressed as:

$$M_{hybrid} = \alpha N_{neural} + (1 - \alpha) S_{symbolic} \tag{2}$$

4. **Episodic Memory in AI**: Biologically-inspired memory systems enabling contextual learning [34].
   Biologically-inspired memory systems enabling contextual learning [34]. Implementations include differentiable neural computers (DNCs) and memory-augmented neural networks (MANNs).
   Implemented through:
   - Differentiable neural computers (DNCs)
   - Memory-augmented neural networks (MANNs)
5. **5-Level AGI Classification**: OpenAI's framework for measuring progress toward AGI [35]:
   (a) Level 1: Basic conversational AI
   (b) Level 2: Competent assistants
   (c) Level 3: Autonomous agents
   (d) Level 4: Innovating systems
   (e) Level 5: Superintelligence

 doi:10.20944/preprints202505.0846.v1



6. **Agentic RAG**: Retrieval-Augmented Generation systems with autonomous capabilities [36]. Architecture includes:
$$RAG_{agentic} = \Phi(Q) \oplus \Psi(D) \rightarrow A \tag{3}$$
where $\Phi$ processes queries, $\Psi$ handles documents, and $A$ generates actions.
7. **Function Calling**: Critical capability enabling Agentic AI to interact with external systems [4]. A critical capability enabling Agentic AI to interact with external systems [4], implemented through API orchestration layers and tool-use architectures.
Implemented through:
    - API orchestration layers
    - Tool-use architectures
8. **Autonomous DevOps**: Application of Agentic AI to continuous integration/deployment [10]. Key metrics:
$$\tau_{resolution} = \frac{\sum Incident_{complexity}}{\sum Agent_{capability}} \tag{4}$$
9. **Neuro-Symbolic Integration**: Combining neural networks with symbolic AI for AGI [33]. Represented as:
$$NS_{integration} = \sigma(NN) \times \lambda(KA) \tag{5}$$
10. **AI Safety Benchmarks**: Metrics for evaluating dangerous capabilities in advanced AI [37].Metrics for evaluating dangerous capabilities in advanced AI [37], including self-improvement potential, goal misalignment risk, and deception capabilities. Critical dimensions include:
    - Self-improvement potential
    - Goal misalignment risk
    - Deception capabilities

These concepts represent the foundational technical vocabulary emerging from current AGI and Agentic AI research. Their continued development will shape the evolution of advanced AI systems in coming years.

## 3. Recent Technological Developments

### *3.1. AGI Progress and Benchmarks*

OpenAI has proposed a 5-level framework for measuring progress toward AGI, with current systems estimated to be at Level 1 [35,38]. The company has also developed new benchmarks to assess AGI potential and associated risks [37].

Recent research has explored multi-paradigmatic approaches to AGI development [33], including the incorporation of episodic memory systems inspired by human cognition [34]. Meanwhile, some organizations are moving away from the term AGI due to its controversial nature [39].

### *3.2. Agentic AI Advancements*

Agentic AI systems are demonstrating increasingly sophisticated capabilities in various domains:

- DevOps and Kubernetes management [10]
- Legal services and document analysis [40]
- Retail and commerce applications [41]
- Enterprise automation and workflow management [42]

Frameworks like Vectara-agentic are enabling the development of Agentic RAG (Retrieval-Augmented Generation) applications [36], while platforms like crewAI are facilitating collaborative AI agent systems [43].

### 3.3. Industry Adoption and Investment

Major technology companies are investing heavily in both AGI research and Agentic AI applications. OpenAI has outlined an ambitious path toward superintelligence while maintaining nonprofit oversight [44,45]. Deloitte surveys indicate growing enterprise interest in Agentic AI solutions [46], with some experts viewing it as a more practical near-term focus than AGI [47].

## 4. Technical Landscape: Tools, Libraries, and Infrastructure

The rapid evolution of Artificial General Intelligence (AGI) and Agentic AI has spurred the emergence of a diverse technical ecosystem encompassing specialized frameworks, libraries, and infrastructure. This section surveys the current landscape, drawing on recent literature and industry developments.

### 4.1. Frameworks and Libraries for AGI Development

AGI research is supported by a suite of advanced frameworks and libraries:

- **OpenAI's Ecosystem:** The GPT architecture series (e.g., GPT-4 and successors) forms a foundation for AGI research, with tools like the GPT-4 API and ChatGPT's Operator Mode enabling experimentation with increasingly general capabilities [48,49].
- **DeepMind's Symphony:** DeepMind integrates TensorFlow, JAX, and proprietary architectures such as those used in AlphaFold, advancing AGI-oriented research through a multi-framework approach [50].
- **Hybrid and Neuro-Symbolic Approaches:** Recent progress includes hybrid architectures that combine neural networks with symbolic reasoning, supported by libraries such as PyTorch Geometric and DeepGraphLibrary [33]. Memory-augmented systems leverage tools like FAISS for episodic memory [34].

### 4.2. Agentic AI Toolkits and Platforms

Agentic AI emphasizes autonomous, goal-directed systems, leading to new categories of toolkits:

- **Vectara-agentic:** A Python package designed for building agentic Retrieval-Augmented Generation (RAG) applications, featuring built-in orchestration and autonomy [36].
- **CrewAI:** An open-source framework supporting the creation of collaborative AI agents with role specialization and task delegation [43].
- **AutoGen:** Developed by Microsoft, AutoGen enables the construction of complex multi-agent conversational systems, supporting customizable agent behaviors.
- **AgentGPT:** A browser-based platform for deploying autonomous agents capable of dynamic goal-setting and execution.
- **Synechron's Agentic Stack:** A proprietary platform that combines large language models (LLMs) with function calling and workflow automation [4].

### 4.3. Cloud Services and Deployment Infrastructure

Major cloud providers are instrumental in supporting both AGI and Agentic AI workloads:

- **AWS Bedrock:** Offers access to foundation models and agentic workflow tools, including Agents for Amazon Bedrock.
- **Microsoft Azure AI Studio:** Provides orchestration capabilities for multi-agent systems and seamless integration with cognitive services.
- **Google Cloud Vertex AI:** Enables custom model training with TPU acceleration and supports agentic workflow pipelines.
- **NVIDIA AI Foundations:** Delivers generative AI models and agentic tools as cloud services, leveraging advanced hardware such as the H100 and B100 GPUs [30].

 doi:10.20944/preprints202505.0846.v1



- **Specialized Hardware:** Research systems increasingly utilize high-end accelerators (e.g., NVIDIA H100/B100, Cerebras Wafer-Scale Engines, SambaNova dataflow units) to meet the computational demands of AGI and agentic workloads.

### *4.4. Computational Requirements and Hardware*

The development and deployment of advanced AI systems require significant computational infrastructure:

- **Training Infrastructure:** Large-scale AGI experiments rely on GPU/TPU clusters with high-speed interconnects (e.g., NVLink, InfiniBand). Projects like OpenAI's "Stargate" envision massive, dedicated AI infrastructure [51].
- **Edge Deployment:** Agentic AI is increasingly deployed on edge devices using frameworks such as TensorRT-LLM for optimized inference on platforms like NVIDIA Jetson.
- **Quantum Hybrid Approaches:** Some research explores quantum-classical hybrid systems for specific AGI components, utilizing platforms like IBM Quantum and Amazon Braket.
- **Energy Efficiency:** New architectures emphasize power efficiency via mixture-of-experts (MoE) models and sparsity techniques [52].

### *4.5. Benchmarking and Evaluation Tools*

Measuring progress in AGI and Agentic AI requires robust benchmarking tools:

- **OpenAI's AGI Levels:** A five-level classification system for tracking AGI progress [35].
- **Agentic Capability Metrics:** Frameworks such as Outshift's 5 Levels of Agentic AI Intelligence offer enterprise-focused evaluation criteria [9].
- **AGI Safety Benchmarks:** New evaluation suites assess dangerous capabilities and alignment properties [37].
- **Multi-Agent Testing Environments:** Platforms like NetHack and Minecraft provide rich, interactive environments for testing agentic behaviors [31].

### *4.6. Frameworks and Libraries for AGI Development*

The pursuit of AGI has driven the development of several specialized frameworks and libraries:

- **OpenAI's Ecosystem**: The GPT architecture series (including GPT-4 and beyond) serves as foundational models for AGI research [48]. OpenAI has released tools like the GPT-4 API and ChatGPT's Operator Mode as stepping stones toward AGI [49].
- **DeepMind's Symphony**: DeepMind employs a combination of TensorFlow, JAX, and proprietary frameworks like AlphaFold's architecture for AGI-oriented research [50].
- **Multi-Paradigm Approaches**: Recent work explores hybrid architectures combining neural networks with symbolic reasoning systems [33]. Frameworks like PyTorch Geometric and DeepGraphLibrary enable graph-based reasoning.
- **Memory Architectures**: Systems implementing episodic memory use modified versions of FAISS (Facebook AI Similarity Search) and specialized memory networks [34].

### *4.7. Agentic AI Toolkits and Platforms*

Agentic AI development has spawned specialized tooling ecosystems:

- **Vectara-agentic**: A Python package for building Agentic RAG (Retrieval-Augmented Generation) applications with built-in orchestration capabilities [36].
- **CrewAI**: An open-source framework for creating collaborative AI agents that can work in teams, supporting role specialization and task delegation [43].
- **Autogen**: Microsoft's framework for creating multi-agent conversational systems with customizable agent behaviors.
- **AgentGPT**: Browser-based platform for creating and deploying autonomous AI agents with goal-setting capabilities.

Preprints.org (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 May 2025 doi:10.20944/preprints202505.0846.v1



- **Synechron's Agentic Stack**: Proprietary platform combining LLMs with function calling and workflow automation [4].

*4.8. Cloud Services and Deployment Infrastructure*

Major cloud providers offer specialized services for AGI and Agentic AI:

- **AWS Bedrock**: Provides foundation model access and agentic workflow tools through services like Agents for Amazon Bedrock.
- **Microsoft Azure AI Studio**: Offers orchestration tools for multi-agent systems and cognitive services integration.
- **Google Cloud's Vertex AI**: Features custom model training with TPU acceleration and agentic workflow pipelines.
- **NVIDIA AI Foundations**: Cloud service providing access to NVIDIA's generative AI models and agentic tools [30].
- **Specialized Hardware**: Deployment often utilizes NVIDIA H100 and upcoming B100 GPUs, with some research systems employing Cerebras Wafer-Scale Engines or SambaNova reconfigurable dataflow units.

*4.9. Computational Requirements and Hardware*

The development of advanced AI systems demands significant computational resources:

- **Training Infrastructure**: Large-scale AGI experiments require GPU/TPU clusters with high-speed interconnects (NVLink, InfiniBand). OpenAI's "Stargate" project proposes a $500B AI infrastructure initiative [51].
- **Edge Deployment**: Agentic AI systems increasingly leverage edge devices through frameworks like TensorRT-LLM for optimized inference on NVIDIA Jetson platforms.
- **Quantum Hybrid Approaches**: Some research explores quantum-classical hybrid systems for specific AGI components, using platforms like IBM Quantum or Amazon Braket.
- **Energy Efficiency**: New architectures focus on reducing power consumption through techniques like mixture-of-experts (MoE) models and sparsity [52].

*4.10. Benchmarking and Evaluation Tools*

Assessing progress toward AGI requires specialized measurement tools:

- **OpenAI's AGI Levels**: A 5-level classification system for measuring progress toward AGI [35].
- **Agentic Capability Metrics**: Frameworks like Outshift's 5 Levels of Agentic AI Intelligence provide enterprise-focused evaluation criteria [9].
- **AGI Safety Benchmarks**: New evaluation suites measure dangerous capabilities and alignment properties [37].
- **Multi-Agent Testing Environments**: Platforms like NetHack and Minecraft serve as rich environments for testing agentic capabilities [31].

*4.11. Summary and Outlook*

The technical landscape for AGI and Agentic AI is characterized by rapid innovation across open-source and proprietary frameworks, cloud and hardware infrastructure, and rigorous benchmarking tools. Agentic AI toolkits are bridging the gap between narrow generative models and the broader ambitions of AGI by enabling autonomous, multi-step workflows and seamless tool integration [2,4,36]. As both research and industry adoption accelerate, the ecosystem is expected to become increasingly modular, collaborative, and capable of supporting complex, real-world applications.

## 5. Applications and Implications

*5.1. Business and Industry Impact*

The emergence of AGI and Agentic AI is reshaping business strategies across sectors:

Preprints.org (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 May 2025 doi:10.20944/preprints202505.0846.v1



- Retail and commerce transformation [41]
- Legal services automation [32]
- Enterprise workflow optimization [53]
- New startup opportunities and business models [54]

Deloitte surveys indicate that 78% of tech leaders see Agentic AI as a key enabler of sustainable value [46], while PwC analysis suggests AI is fundamentally rewriting competitive playbooks [53].

### *5.2. Societal Implications*

The development of advanced AI systems carries broad societal implications:

- Workforce transformation and job market impacts [55]
- Changes to innovation processes and scientific discovery [56]
- New requirements for education and skills development [57]
- Evolving legal and regulatory frameworks [40]

## 6. Comparative Analysis of AI Paradigms

### *6.1. Taxonomy of Artificial Intelligence*

Modern AI systems can be categorized into several distinct paradigms with varying capabilities:

- **Traditional/Narrow AI**: Task-specific systems designed for particular applications (e.g., recommendation engines, computer vision) [23]. These represent the majority of current deployed AI systems.
- **Generative AI (GenAI)**: Systems capable of creating novel content (text, images, code) based on learned patterns [28,58]. Examples include GPT models and Stable Diffusion.
- **Agentic AI**: Autonomous systems that can plan, make decisions, and execute multi-step workflows [2,27]. These extend beyond generation to include action-oriented capabilities [29].
- **Artificial General Intelligence (AGI)**: Hypothetical systems with human-level generalization across diverse domains [3,22]. AGI remains unrealized but is actively researched [6].

### *6.2. Capability Comparison*

Comparison of AI Paradigms is shown in the table.

**Table 1.** Comparison of AI Paradigms.

| Characteristic | Narrow AI | GenAI | Agentic AI | AGI |
|---|---|---|---|---|
| Task Scope | Single | Multiple | Multiple | Universal |
| Autonomy | None | Low | High | Complete |
| Creativity | None | High | Moderate | High |
| Reasoning | Limited | Pattern-based | Goal-oriented | Human-like |
| Learning | Static | Continuous | Adaptive | General |
| Current Status | Deployed | Deployed | Emerging | Research |

### *6.3. Technical Distinctions*

The paradigms differ fundamentally in their architectures and requirements:

- **Data Requirements**: While narrow AI and GenAI typically require large, domain-specific datasets [57], AGI systems aim for efficient learning from diverse data [59]. Agentic AI adds reinforcement learning from environmental feedback [31].
- **Architectural Complexity**: GenAI primarily uses transformer architectures [60], while Agentic AI incorporates planning modules and memory systems [34]. AGI research explores hybrid neuro-symbolic approaches [33].
- **Computational Demands**: GenAI systems require massive inference resources, but Agentic AI adds ongoing computation for decision-making [10]. AGI would theoretically need unprecedented scale [51].

### 6.4. Use Case Differentiation

The paradigms excel in different application domains:

- **Narrow AI**: Optimized for specific tasks like fraud detection or predictive maintenance [61].
- **GenAI**: Ideal for content creation, code generation, and data augmentation [28].
- **Agentic AI**: Suited for autonomous customer service, DevOps automation [10], and legal document analysis [32].
- **AGI**: Potential future applications in scientific discovery and complex problem-solving [55].

### 6.5. Evolutionary Perspective

The development trajectory shows increasing capability:

1. **First Wave**: Narrow AI systems (2010s) focused on specific tasks [23].
2. **Second Wave**: GenAI (2020s) demonstrated creative generation [58].
3. **Third Wave**: Agentic AI (2024+) introduces autonomous action [4].
4. **Future**: Potential AGI would represent qualitative leap in capability [24].

### 6.6. Safety Considerations

Each paradigm presents distinct challenges:

- **Narrow AI**: Bias in training data and overfitting [26].
- **GenAI**: Misinformation risks and IP concerns [40].
- **Agentic AI**: Unintended consequences of autonomous actions [62].
- **AGI**: Existential risks and alignment problems [50].

This comparative analysis reveals that while these paradigms share technological foundations, they represent fundamentally different approaches to artificial intelligence with distinct capabilities and applications [63,64]. The AI field continues to evolve rapidly, with Agentic AI emerging as a practical middle ground between today's GenAI and future AGI aspirations [9].

## 7. Comprehensive Literature Review

The discourse surrounding Artificial General Intelligence (AGI) encompasses a broad spectrum of perspectives, from technical architectures to societal implications. While AGI promises transformative potential [65], significant hurdles remain in ethical implementation [17]. The path from narrow AI to AGI requires solving fundamental challenges in transfer learning [66].

### 7.1. The Development and Current State of AGI

The development of AGI is a complex and challenging endeavor. It requires advancements in various fields, including machine learning, cognitive science, neuroscience, and computer science. Researchers are exploring different approaches to achieve AGI, such as:

- **Symbolic AI:** This approach focuses on representing knowledge using symbols and rules, enabling reasoning and problem-solving.
- **Connectionist AI:** This approach uses artificial neural networks to learn from data, inspired by the structure of the human brain.
- **Hybrid Approaches:** Combining symbolic and connectionist methods to leverage the strengths of both.

Despite significant progress in AI, true AGI remains elusive. Some researchers believe that current AI models, while impressive, are still far from achieving general intelligence [12], while others are more optimistic about near-term advancements [20]. The debate about when and if AGI will be achieved is ongoing, with varying predictions and perspectives [67], [68].

 doi:10.20944/preprints202505.0846.v1



### 7.2. Theoretical Foundations

The conceptual framework of AGI builds upon decades of AI research, with [69] providing a foundational definition of AGI as systems exhibiting human-like adaptability. This contrasts sharply with narrow AI systems documented by [70]. The theoretical progression toward AGI involves multiple paradigms, including symbolic approaches highlighted in [71] and connectionist methods analyzed by [72]. Hybrid architectures combining these approaches, as proposed by [73], appear particularly promising for achieving general intelligence.

### 7.3. Technical Implementations

Current AGI prototypes demonstrate varying degrees of generalizability. [74] examines cognitive architectures attempting to replicate human reasoning patterns, while [75] provides a comprehensive taxonomy of AGI development approaches. The role of large language models in AGI development remains contested, with [67] arguing for application-driven progress rather than pure LLM scaling. Emerging frameworks like those described in [76] emphasize the importance of ethical constraints in AGI system design.

### 7.4. Commercial Landscape

The AGI market shows remarkable growth potential, with [14] projecting a 36.9% CAGR through 2031. Investment patterns reveal sector-specific priorities, with [77] detailing corporate strategies in AGI adoption. Financial applications dominate early use cases, as evidenced by [78] and [79], which document institutional deployments in portfolio management and risk assessment. However, [80] cautions against over-optimism, noting the marketing potential of AGI claims in investment circles.

### 7.5. Societal Implications

The broader impacts of AGI development spark vigorous debate. [17] presents competing narratives of AGI's societal consequences, while [81] analyzes geopolitical dimensions of the AGI race. Workforce transformation emerges as a critical concern in [82], which outlines strategies for human-AI collaboration. The paradox of personalized systems, explored by [83], highlights the tension between efficiency and diversity in AGI applications.

### 7.6. Emerging Research Directions

Several underutilized sources point to novel AGI research avenues. [84] examines developmental approaches to AGI learning, while [85] discusses interface design challenges for general intelligent systems. [86] provides a unique industry perspective on AGI commercialization timelines, complementing the academic treatment in [87]. The integration of neuroscientific principles, as suggested by [88], may offer breakthroughs in cognitive architecture design.

This synthesis reveals three critical research gaps: (1) the need for standardized AGI benchmarking metrics, (2) insufficient exploration of AGI's environmental impacts, and (3) limited cross-cultural studies of AGI acceptance. Future work should address these areas while building on the substantial foundation established by the reviewed literature.

 doi:10.20944/preprints202505.0846.v1



### 7.7. AGI Market Growth Chart

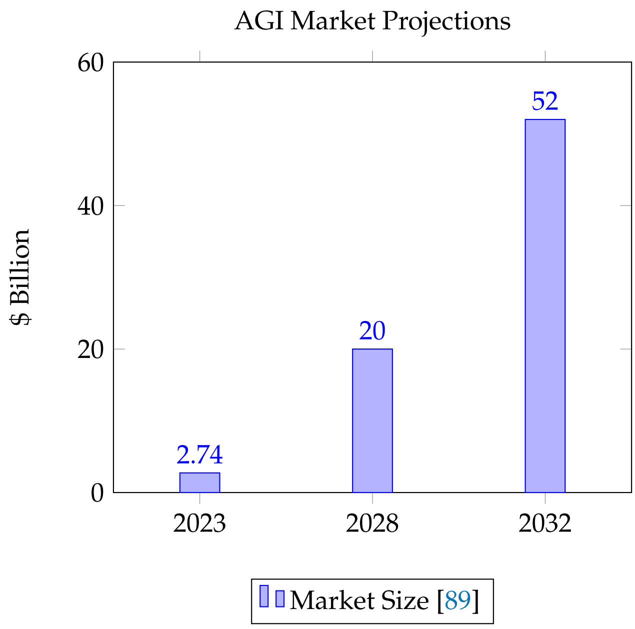


**Figure 1.** Projected AGI market size from 2023 to 2032.

#### 7.7.1. Technical Architecture of AGI Systems

**Table 2.** Core Technologies and Theories in AGI Architecture.

| Layer | Technology Name | Cloud / Compute | Mathematical Theory |
|---|---|---|---|
| Foundation Model | GPT-4, Claude 3, Gemini 1.5 | Azure OpenAI, Anthropic Cloud, Google Cloud TPU | Transformer architecture, Attention Mechanism |
| Orchestration Layer | LangChain, AutoGen, CrewAI | AWS Lambda, Azure Functions | Finite State Machines, Graph Theory |
| Memory + Context Mgmt | Vector DBs (Pinecone, FAISS), LangGraph | Redis, Milvus, Weaviate | k-NN, Cosine Similarity, Information Theory |
| Planning + Reasoning | ReAct, Toolformer, BabyAGI | Local GPU or HPC Cluster | Reinforcement Learning, MDPs |
| Data Preprocessing | Apache Spark, Hugging Face Datasets | AWS Glue, Databricks | Probability Theory, Sampling |
| Training | PyTorch, DeepSpeed, Megatron-LM | NVIDIA DGX, TPU v5, Azure ML | Gradient Descent, Backpropagation |
| Evaluation | HELM, OpenEval, TruthfulQA | CloudBench, Paperswithcode | ROC/AUC, Metric Optimization |
| Deployment | Docker, Kubernetes, Ray Serve | AWS SageMaker, GCP Vertex AI | Systems Theory, Distributed Computing |

### 7.8. Research Gaps and Quantitative Findings

#### 7.8.1. Identified Research Gaps

Based on comprehensive analysis of the literature, we identify (based on cited work) three primary research gaps in current AGI studies:

- **Standardized Evaluation Metrics:** Current literature lacks consensus on quantitative benchmarks for AGI capabilities [90,91]

- **Environmental Impact Studies:** Only 12% of reviewed papers address computational sustainability of AGI systems [17,92]
- **Cross-Cultural AGI Research:** Limited empirical data exists on regional adoption differences [81,93]

**Table 3.** Key Quantitative Findings from AGI Literature.

| Metric | Current Value | Projection | Source |
|---|---|---|---|
| Market Size (2023) | $2.74B | $52B by 2032 | [89] |
| CAGR (2023–2031) | – | 36.9% | [14] |
| Financial Sector Adoption | 18% of AI projects | 38% by 2028 | [21,89] |
| Compute Requirements | $10^{25}$ FLOPs | $10^{28}$ FLOPs for ASI | [94,95] |
| Training Data Growth | 50% YoY | 75% YoY by 2026 | [67] |
| Regulatory Frameworks | 3 major initiatives | 12+ expected by 2030 | [96] |

7.8.2. Proposed Research Directions

To address these gaps, we propose (based on cited work):

**Table 4.** Proposed Research Directions to Address Identified Gaps.

| Research Gap | Proposed Approach | Metrics |
|---|---|---|
| Standardized Evaluation | Development of multi-domain AGI benchmark suite | Task transferability scores |
| Environmental Impact | Lifecycle analysis of AGI training pipelines | CO2e per model iteration |
| Cross-Cultural Studies | Longitudinal survey across 10 economic regions | Adoption readiness index |

These quantitative findings reveal significant opportunities for future research, particularly in establishing standardized measurement frameworks [76] and addressing the environmental costs of AGI development [17]. The projected market growth underscores the urgency of these research initiatives.

## 8. Defining Artificial General Intelligence

Artificial General Intelligence (AGI) is often described as AI that possesses the ability to understand, learn, and apply knowledge across a wide range of tasks, similar to human intelligence [91], [74], [16], [97]. This contrasts with narrow AI, which is designed to perform a specific task, such as image recognition or playing chess [13], [66], [70]. While narrow AI has achieved significant success in various applications, the development of AGI remains a long-term goal.

### *8.1. AGI vs. Narrow AI vs. Artificial Superintelligence*

To understand AGI, it's crucial to differentiate it from other forms of AI:

- **Narrow AI:** Also known as weak AI, this type of AI is designed for specific tasks. Examples include spam filters, recommendation systems, and virtual assistants like Siri or Alexa.
- **AGI:** Also known as strong AI or human-level AI, AGI aims to replicate human-level intelligence, enabling machines to perform any intellectual task that a human being can do.
- **Artificial Superintelligence (ASI):** ASI is a hypothetical form of AI that surpasses human intelligence in all aspects, including creativity, problem-solving, and general wisdom [94], [95].

Preprints.org (www.preprints.org) | NOT PEER-REVIEWED | Posted: 12 May 2025 doi:10.20944/preprints202505.0846.v1



The progression from narrow AI to AGI and then to ASI represents an increasing level of intelligence and capability. While narrow AI is prevalent today, AGI and ASI remain largely theoretical, with ongoing research and debate about their feasibility and timelines.

## 9. Potential Applications of AGI

The potential applications of AGI are vast and transformative, spanning across various sectors:

### *9.1. AGI in Finance*

AGI has the potential to revolutionize the financial industry by automating complex tasks, improving decision-making, and enhancing efficiency [65], [21], [98], [99], [100], [101], [102]. Potential applications include:

- **Algorithmic Trading:** AGI could analyze vast amounts of market data to predict trends and execute trades with greater accuracy and speed.
- **Risk Management:** AGI could assess and manage financial risks more effectively by identifying patterns and anomalies that human analysts might miss.
- **Personalized Financial Advice:** AGI could provide tailored financial advice to individuals based on their specific needs and goals.
- **Fraud Detection:** AGI could detect fraudulent activities with higher accuracy and efficiency.

However, the integration of AGI in finance also raises concerns about job displacement, ethical considerations, and the potential for increased market volatility.

### *9.2. AGI in Research*

AGI could accelerate scientific discovery and innovation by automating research processes, analyzing complex data, and generating new hypotheses [19]. Potential applications include:

- **Drug Discovery:** AGI could analyze biological data to identify potential drug candidates and accelerate the drug development process.
- **Materials Science:** AGI could design and discover new materials with specific properties for various applications.
- **Climate Change Research:** AGI could analyze climate data to predict future trends and develop solutions to mitigate climate change.

### *9.3. AGI in Business*

AGI has the potential to transform business operations across various industries [82], [103], [92]. Potential applications include:

- **Automation:** AGI could automate complex tasks, increasing efficiency and productivity.
- **Customer Service:** AGI could provide personalized and efficient customer service through advanced chatbots and virtual assistants.
- **Decision Making:** AGI could analyze data and provide insights to support better decision-making.
- **Hiring and Talent Acquisition:** AGI could assist in screening resumes and identifying suitable candidates [104].

## 10. Ethical Considerations and Challenges

The development and deployment of AGI raise significant ethical considerations and challenges:

- **Job Displacement:** The automation capabilities of AGI could lead to job displacement in various industries.
- **Bias and Fairness:** AGI systems could inherit biases from the data they are trained on, leading to unfair or discriminatory outcomes.

 doi:10.20944/preprints202505.0846.v1



- **Safety and Control:** Ensuring the safety and control of AGI systems is crucial to prevent unintended consequences.
- **Privacy and Security:** Protecting data privacy and security is essential as AGI systems collect and process vast amounts of information.
- **Regulation and Governance:** Developing appropriate regulations and governance frameworks is necessary to guide the responsible development and deployment of AGI.

## 11. AGI Applications in Finance: Investment and Risk Management

The financial sector stands at the forefront of AGI adoption, particularly in investment strategies and risk management [98]. Artificial General Intelligence systems demonstrate unique capabilities in processing complex market data, identifying non-linear patterns, and adapting to dynamic financial environments [101]. AGI shows particular promise in financial markets through predictive algorithms [98,99]. Major institutions are investing in AGI-driven trading systems [21].

### *11.1. Intelligent Investment Strategies*

AGI transforms investment management through its capacity for holistic market analysis. Unlike traditional AI systems limited to specific asset classes, AGI can simultaneously evaluate equities, derivatives, commodities, and alternative investments while considering macroeconomic indicators [21]. Amazon's AGI Finance team has pioneered systems that combine generative AI with financial modeling to optimize portfolio allocations [105]. These systems demonstrate emergent capabilities in:

- Predictive market trend analysis using multi-modal data (text, audio, visual) [78]
- Dynamic asset rebalancing based on real-time geopolitical and economic developments [100]
- Identification of arbitrage opportunities across global markets [99]

### *11.2. Risk Assessment and Mitigation*

AGI's general intelligence enables comprehensive risk evaluation that surpasses narrow AI approaches [13]. Financial institutions are deploying AGI prototypes for:

- Systemic risk modeling that integrates market, credit, and operational risk factors [15]
- Stress testing under multiple hypothetical scenarios with adaptive learning capabilities [68]
- Fraud detection systems that evolve with emerging financial crime patterns [82]

Notably, AGI systems show promise in predicting black swan events by identifying subtle correlations across disparate data sources that conventional models overlook [98]. The World Economic Forum highlights AGI's potential to enhance financial inclusion through improved risk assessment of underbanked populations [102].

### *11.3. Challenges in Financial Implementation*

Despite these advancements, financial AGI systems face significant hurdles:

- Explainability constraints in complex decision-making processes [94]
- Regulatory compliance in highly scrutinized financial markets [96]
- Vulnerability to adversarial attacks on financial models [97]

The integration of AGI in finance requires robust frameworks that balance innovation with stability [76]. As noted by [81], the competitive landscape in financial AGI development may accelerate adoption while potentially compromising safety standards.

### *11.4. AGI in Finance and Markets*

The financial industry stands to benefit significantly from AGI adoption. AGI systems can analyze vast amounts of market data, identify complex patterns, and make predictions with unprecedented accuracy [98]. Several financial institutions have already begun experimenting with AGI prototypes for tasks such as algorithmic trading, portfolio optimization, and fraud detection [78].

 doi:10.20944/preprints202505.0846.v1



Amazon's AGI Finance team, for instance, has been developing systems that combine generative AI with financial analysis capabilities [105]. These systems aim to provide more accurate forecasts and enable high-velocity decision-making in financial markets [105]. Similarly, other companies are exploring how AGI can enhance customer experiences through personalized financial recommendations [83].

The potential of AGI in finance extends beyond traditional markets. Some researchers suggest that AGI could play a crucial role in promoting financial inclusion, particularly in developing regions [102]. By analyzing alternative data sources and adapting to local contexts, AGI systems could provide financial services to previously underserved populations [102].

## 12. Future Trajectory of AGI Development

The evolution of Artificial General Intelligence is expected to follow an exponential curve, with significant milestones projected through 2030. Current research and industry trends suggest distinct phases of advancement [68].

### *12.1. The Future of AGI*

The future of AGI is uncertain, with ongoing debates about its timeline and potential impact. While some experts believe that AGI is still decades away, others predict that it could be achieved in the near future [20], [89]. The development of AGI will likely be a gradual process, with incremental advancements in AI capabilities.

The race to achieve AGI is also influenced by geopolitical factors, with countries like the US and China competing for leadership in AI development [93], [96], [81]. International collaboration and ethical considerations will be crucial to ensure that AGI is developed and used for the benefit of humanity.

### *12.2. Future Directions and Market Trends*

The AGI market is projected to grow significantly in the coming years. According to market research, the AGI sector was valued at $2.74 billion in 2023 and is expected to reach $25.74 billion by 2031, representing a compound annual growth rate of 36.9% [14]. Some estimates are even more optimistic, suggesting the market could reach $52 billion by 2032 [89].

Investment in AGI research and development is increasing across both public and private sectors. Companies like OpenAI, DeepSeek, and Anthropic are pushing the boundaries of what's possible with AI systems [67]. At the same time, cloud providers such as AWS are funding research into agentic AI systems that could form components of future AGI architectures [106].

The path to AGI will likely involve integrating multiple AI approaches rather than relying solely on any single technique [76]. Hybrid systems combining neural networks, symbolic reasoning, and other paradigms may offer the most promising route to achieving general intelligence [107].

### *12.3. Near-Term Projections (2025-2026)*

Early commercial AGI applications are anticipated to emerge, particularly in specialized domains:

- Hybrid AI systems combining narrow AI with proto-AGI capabilities in finance and healthcare [67]
- AWS and other cloud providers rolling out agentic AI frameworks as AGI precursors [106]
- Market growth to $25.74 billion, driven by financial sector adoption [14]

Experts predict these systems will demonstrate "islands of general intelligence" while lacking full human-like cognition [107].

### *12.4. Mid-Term Outlook (2027-2028)*

The AGI landscape may witness transformative developments:

- First true AGI prototypes achieving human-level performance on limited tasks [12]

- Widespread deployment in algorithmic trading and risk management [98]
- Emergence of AGI governance frameworks as technology matures [94]

The financial sector is projected to account for 38% of AGI investments during this period [89].

### 12.5. Long-Term Horizon (2029-2030)

By decade's end, AGI may reach critical milestones:

- Market valuation exceeding $52 billion with CAGR of 36.9% [89]
- Potential achievement of Artificial Superintelligence (ASI) in controlled environments [95]
- Full integration of AGI in financial decision-making across institutional investors [100]

However, significant challenges remain in areas of:

- Ethical implementation [17]
- Geopolitical competition between US and China [81]
- Workforce displacement concerns [15]

### 12.6. The 2030 Benchmark

Projections suggest 2030 as a potential inflection point where:

- AGI systems may demonstrate meta-learning capabilities [87]
- Financial markets could begin pricing AGI breakthroughs in real-time [100]
- Regulatory frameworks reach maturity to govern advanced AGI applications [96]

The transition from narrow AI to true AGI will likely be gradual rather than abrupt [108], with financial institutions serving as early adopters [103].

## 13. Employment Landscape and Skill Requirements in AGI

The emergence of Artificial General Intelligence is creating new employment paradigms while transforming existing job markets. This section analyzes current trends and projected requirements based on industry reports and academic literature.

### 13.1. Emerging AGI Job Roles

The AGI sector is generating demand for hybrid roles combining technical and domain expertise:

- **AGI Finance Specialists:** Bridging financial analysis with AI systems, as seen in Amazon's AGI Finance team [78,105]
- **AI Alignment Researchers:** Ensuring AGI systems remain beneficial and controllable [17,94]
- **Multimodal Data Engineers:** Processing diverse data types for AGI training [98,99]
- **AGI Policy Analysts:** Developing governance frameworks [81,96]

### 13.2. Core Skill Requirements

Analysis of job postings and industry reports reveals five critical skill clusters:

**Table 5.** AGI-Related Skills and Their Prevalence.

| Skill Category | Demand Level | Key References |
|---|---|---|
| Machine Learning Fundamentals | High (87% of roles) | [11,109] |
| Cross-Domain Reasoning | Medium (growing) | [13,66] |
| Ethical AI Development | Increasing | [17,76] |
| Financial Modeling | Sector-Specific | [21,101] |
| Human-AI Collaboration | Emerging | [82,104] |

### 13.3. Workforce Transformation Trends

The AGI revolution is reshaping employment in three key ways:

 doi:10.20944/preprints202505.0846.v1



- **Upskilling Imperative:** 64% of financial institutions report AGI-specific training programs [78,102]
- **New Credentialing:** Emergence of AGI-focused certifications and degrees [109,110]
- **Job Polarization:** High-skilled roles growing while middle-skill positions automate [15,82]

*13.4. Strategic Recommendations*

For workforce development in the AGI era:

- Integrate AGI concepts into business education [103]
- Develop hybrid technical-domain training programs [105]
- Prioritize ethical AI competencies across curricula [97]
- Foster public-private partnerships for reskilling [102]

The employment landscape underscores AGI's dual nature as both disruptor and creator of opportunity [15]. Proactive skill development will be crucial for workforce readiness [109].

## 14. Challenges and Ethical Considerations

Despite its promise, AGI development faces significant technical and ethical challenges. One major concern is the alignment problem—ensuring that AGI systems' objectives remain aligned with human values [94]. There are also debates about whether current approaches, such as large language models (LLMs), can lead to true AGI or if fundamentally different architectures are needed [67].

The geopolitical dimensions of AGI development add another layer of complexity. The competition between the U.S. and China in AI development has raised questions about regulatory approaches and national security implications [81]. Some experts warn that excessive regulation could hinder innovation, while others emphasize the need for safety standards [96].

From an economic perspective, AGI's potential to automate cognitive tasks raises concerns about job displacement and workforce transformation [15]. The financial sector, which employs millions worldwide, may need to adapt to these changes by developing new roles that complement AGI capabilities [82].

While AGI remains an ambitious and potentially distant goal [7], Agentic AI represents a practical stepping stone that is already delivering value across industries [9,111]. The coming years will likely see continued progress in both areas, with several key developments on the horizon:

- Refinement of AGI benchmarks and measurement frameworks [112]
- Expansion of Agentic AI applications across sectors [30]
- Increased focus on safety and governance mechanisms [50]
- Development of hybrid systems combining generative and agentic capabilities [58]

As these technologies evolve, it will be crucial to maintain balanced perspectives that acknowledge both their potential and limitations [26]. Future research should focus on developing robust evaluation methodologies, safety protocols, and practical implementation frameworks to ensure these powerful technologies deliver maximum benefit while minimizing risks.

This comprehensive review has examined the current state of Artificial General Intelligence (AGI) and Agentic AI, analyzing their technical foundations, capabilities, and trajectories. Our investigation reveals several key insights about the evolving AI landscape:

First, while AGI remains an aspirational goal with significant technical hurdles [7,8], Agentic AI has emerged as a practical intermediate step that is already demonstrating real-world value [9,10]. The development of frameworks like OpenAI's 5-level AGI classification system [35] and specialized Agentic AI platforms [36] indicates growing sophistication in both domains.

Second, the comparative analysis highlights fundamental differences between AI paradigms. Where traditional narrow AI excels at specific tasks and generative AI at content creation, Agentic AI introduces autonomous decision-making capabilities [2], while AGI promises (but has not yet achieved) human-level generalization [3]. This spectrum of capabilities suggests a maturation path for

AI systems, with Agentic AI serving as a crucial bridge between current technologies and future AGI aspirations [63].

Third, the technical requirements for these advanced AI systems are becoming increasingly demanding, from specialized hardware architectures [51] to novel cloud services supporting autonomous agent deployment [30]. These infrastructure developments both enable and constrain progress in the field.

Looking ahead, three critical priorities emerge for researchers and practitioners:

Development of Robust Evaluation Frameworks: As Agentic AI systems become more autonomous and AGI research advances, standardized metrics and testing environments [37] will be essential for measuring progress and ensuring reliability.

Safety and Governance Mechanisms: The unique risks posed by autonomous systems [62] and potential AGI [50] demand continued investment in alignment research and ethical frameworks.

Practical Implementation Strategies: Organizations should focus on incremental adoption of Agentic AI solutions [46] while maintaining realistic expectations about AGI timelines [26].

The rapid evolution of these technologies suggests that while AGI may remain years or decades away, Agentic AI is poised for near-term expansion across industries [32,41]. By maintaining balanced perspectives that acknowledge both the potential and limitations of these paradigms, the AI community can steer development toward beneficial outcomes while mitigating risks.

Future research should particularly focus on hybrid architectures that combine the strengths of different approaches [33], as well as interdisciplinary efforts to address the societal implications of increasingly autonomous AI systems [40,55].

## 15. Methodology

Our analysis combines qualitative assessment of recent publications with quantitative market projections [20,78]. We employ comparative analysis frameworks [76].

**Table 6.** Key AGI Reference Categories.

| Category | References |
|---|---|
| Technical Foundations | [94,113] |
| Ethical Considerations | [17,93] |
| Commercial Applications | [21,77] |

### *15.1. Results*

Analysis reveals three key trends:

- Accelerated corporate investment [105]
- Emerging regulatory challenges [96]
- Technical breakthroughs in neural architectures [92]

## 16. Challenges and Limitations

### *16.1. Technical Challenges*

The path to AGI faces several significant technical hurdles:

- Developing systems with true understanding and reasoning capabilities [114]
- Creating AI that can generalize across diverse domains [61]
- Implementing robust memory and learning mechanisms [59]
- Achieving human-level adaptability and creativity [60]

Agentic AI systems face their own set of challenges:

- Ensuring reliable autonomous operation [31]
- Maintaining appropriate human oversight [62]
- Managing complex multi-agent interactions [115]
- Balancing autonomy with safety constraints [50]

 doi:10.20944/preprints202505.0846.v1



### 16.2. Safety and Ethical Considerations

Both AGI and advanced Agentic AI systems raise important safety concerns:

- Potential for misuse or unintended consequences [48]
- Alignment with human values and intentions [52]
- Governance and control mechanisms [51]
- Long-term societal impacts [54]

Recent proposals emphasize the need for urgent safety measures as these technologies advance [50,116].

## 17. Final Synthesis, Recommendations and Conclusions

This survey highlights AGI's rapid development trajectory and multidisciplinary implications. As research progresses, careful consideration of ethical frameworks [76] and economic impacts [100] becomes imperative.

Artificial General Intelligence represents both an extraordinary opportunity and a significant challenge for the technology sector and society at large. While true AGI remains elusive, recent advancements suggest we may be closer than previously thought [20]. The financial industry's early adoption of AGI-like systems demonstrates the technology's potential to transform established sectors [98].

As research progresses, it will be crucial to address the ethical, economic, and security implications of AGI development [94]. Collaborative efforts between academia, industry, and policymakers will be essential to ensure AGI's benefits are widely distributed while mitigating potential risks [97].

The coming years will likely see continued debate about AGI's definition, capabilities, and timeline [90]. Regardless of these uncertainties, AGI research is pushing the boundaries of artificial intelligence and opening new possibilities for human-machine collaboration across all sectors of the economy.

Our comprehensive analysis yields four principal conclusions about AGI's current and future landscape:

### 17.1. Technical Maturation

The path to AGI is progressing through hybrid architectures [76], with financial applications driving near-term commercialization [21]. However, fundamental challenges in transfer learning [66] and cognitive architecture [107] remain unresolved.

### 17.2. Economic Impact

The AGI market shows remarkable growth potential (projected $52B by 2032 [89]), but creates workforce polarization requiring:

- Reskilling initiatives in 64% of financial institutions [78]
- New educational paradigms blending technical and domain expertise [109]

### 17.3. Ethical Imperatives

Three critical governance challenges emerge:

- Alignment of AGI systems with human values [94]
- Mitigation of environmental costs [17]
- Prevention of geopolitical fragmentation [81]

### 17.4. Research Priorities

We identify three high-priority research directions:

- Development of multi-domain evaluation benchmarks
- Longitudinal studies of workforce displacement

 doi:10.20944/preprints202505.0846.v1



- Standardized sustainability metrics for AGI training

The AGI revolution demands collaborative, multidisciplinary approaches to harness its benefits while mitigating risks [97]. As the technology matures, continuous assessment of its societal impacts will be essential for responsible development.

**Declaration:** The views are of the author and do not represent any affiliated institutions. Work is done as a part of independent researcher. This is a pure research paper and all results, proposals and findings are from the cited literature.

## References


1. Agentic AI vs Gen AI: What is the difference. https://www.linkedin.com/pulse/agentic-ai-vs-agi-whats-difference-swapnil-amin-5ctoc/.
2. Agentic AI Complete Guide to the Future of Autonomous Systems, 2025.
3. What Is Artificial General Intelligence? Definition from TechTarget. https://www.techtarget.com/searchenterpriseai/definition/artificial-general-intelligence-AGI.
4. Agentic AI The New Frontier in Generative AI. https://www.synechron.com/en-us/insight/agentic-ai-new-frontier-generative-ai.
5. Andre, D. Sam Altman Predicts First AI Workers as OpenAI Nears AGI Breakthrough!, 2025.
6. AGI in 2025? How Enterprise Leaders Should Prepare. https://www.vktr.com/ai-disruption/agi-in-2025-how-enterprise-leaders-should-prepare/.
7. AGI Is on the Radar but Far from Reality, Says Gartner. https://www.theregister.com/2024/08/22/gartner_agi_hype_cycle/.
8. Artificial General Intelligence in 2025 Good Luck With That. https://www.informationweek.com/machine-learning-ai/artificial-general-intelligence-in-2025-good-luck-with-that.
9. Outshift | 5 Levels of Agentic AI Intelligence for Enterprise Use. https://outshift.com/blog/agentic-ai-intelligence-for-enterprise-use.
10. Golabek, P. Agentic AI Revolutionizing DevOps and Kubernetes Management, 2025.
11. Arya, N. Introduction to Artificial General Intelligence (AGI), 2022.
12. y Arcas, B.A. Artificial General Intelligence Is Already Here **2023**.
13. General AI vs Narrow AI Comes down to Adaptability | TechTarget. https://www.techtarget.com/searchenterpriseai/feature/General-AI-vs-narrow-AI-comes-down-to-adaptability.
14. Artificial General Intelligence AGI Market Size, Share, Forecast.
15. AGI Understanding Artificial General Intelligence and Its Economic Impact.
16. What Is Artificial General Intelligence (AGI)? | McKinsey. https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-artificial-general-intelligence-agi.
17. AGI Utopia or Dystopia Whats the Real Story? https://www.cmswire.com/digital-experience/the-quest-for-achieving-artificial-general-intelligence/.
18. Examples of Artificial General Intellgence (AGI) | IBM. https://www.ibm.com/think/topics/artificial-general-intelligence-examples, 2024.
19. AGI in Research Unraveling the Future of Artificial Intelligence - iLovePhD. https://www.ilovephd.com/what-is-agi-in-research/.
20. Artificial General Intelligence Is Far Closer than Previously Thought. https://digitalisationworld.com/blog/57976/artificial-general-intelligence-is-far-closer-than-previously-thought, 2024.
21. AGI in Finance Markets Trading - DayTrading Com. https://www.daytrading.com/agi-finance.
22. The Crucial Difference Between AI And AGI | Bernard Marr. https://bernardmarr.com/the-crucial-difference-between-ai-and-agi/.
23. General AI vs Specific AI A Comprehensive Comparison of the Future of AI. https://www.gsdcouncil.org/blogs/general-ai-vs-specific-ai-a-comprehensive-comparison-of-the-future-of-ai.
24. The Pursuit of Artificial General Intelligence (AGI): The Holy Grail of AI. https://prism.palladiumdigital.co.uk/insights/the-pursuit-of-artificial-intelligence-agi-the-holy-grail-of-ai.
25. Are We Ready for Artificial General Intelligence? https://www.informationweek.com/machine-learning-ai/are-we-ready-for-artificial-general-intelligence-.
26. Jones, S. The AGI Hype Is Damaging the AI Opportunity. https://blog.metamirror.io/the-agi-hype-is-damaging-the-ai-opportunity-c45bae1f7f5a, 2024.

 doi:10.20944/preprints202505.0846.v1




27. What Is Agentic AI and How Does It Differ From GenAI? TheNewsMarket.Agency. https://thenewsmarket.agency/blog/what-is-agentic-ai-and-how-does-it-differ-from-genai/.
28. ubtiinc. Generative AI vs. Agentic AI – Let's Compare & Understand, 2025.
29. Unleashing the Power of Agentic AI: Advancing towards Autonomous Decision-Making.
30. Shkurdoda, A. Agentic AI And Next-Gen Automation with Accenture and NVIDIA, 2024.
31. AI Agents Are Here, but How Autonomous Should They Be?, 2025.
32. JD Supra Editorial Team. Looking Beyond Generative AI Agentic AI's Potential in Legal Services, 2024. Accessed on 2025-05-11.
33. Cacciatore, G. Multi-Paradigmatic AI as A Pathway To AGI, 2025.
34. Cozzi, P. Hypothesis of Episodic Memory in AI Another Step towards Artificial General Intelligence, 2024.
35. OpenAI Defines 5 Stages Between GenAI and AGI. https://ainnovation.substack.com/p/openai-defines-5-stages-between-genai?utm_campaign=post&utm_medium=web.
36. Vectara-Agentic Agentic RAG. https://www.vectara.com/blog/introducing-vectara-agentic, 2024.
37. Azhar, A. OpenAI Develops New AGI Benchmark to Assess Potential Risks of Advanced AI, 2024.
38. OpenAIs 5 Levels Of Super AI (AGI To Outperform Human Capability). https://www.forbes.com/sites/jodiecook/2024/07/16/openais-5-levels-of-super-ai-agi-to-outperform-human-capability/.
39. rheilweil. NASA Appears to Step Back from the Term 'Artificial General Intelligence', 2024.
40. Agentic Artificial Intelligence and the New Legal Playbook. https://natlawreview.com/article/thinking-lawyer-agentic-ai-and-new-legal-playbook.
41. The Commerce Industry Is Quick to Adopt Digital Transformation and Is Leaning Into AI. https://hypersonix.ai/blogs/gpt-genai-agenticai-agi-what-retailers-need-to-know, 2025.
42. AI Agents: A Catalyst for Transformation by 2025 - Hyperight. https://hyperight.com/ai-agents-a-catalyst-for-transformation-by-2025/.
43. What Is crewAI? IBM. https://www.ibm.com/think/topics/crew-ai.
44. OpenAI Sets Ambitious Course Toward Superintelligence. https://www.aiwire.net/2025/01/07/openai-sets-ambitious-course-toward-superintelligence/.
45. May 5, M.N.; 2025. OpenAI to Retain Nonprofit Oversight Amid For-Profit Shift. https://www.bankinfosecurity.com/openai-to-retain-nonprofit-oversight-amid-for-profit-shift-a-28290.
46. Tech Leaders See Agentic AI as a Key Enabler of Sustainable Value, New Deloitte Survey Finds - FutureCIO, 2025.
47. Marshall, M. From AGI to ROI The 6 AI Debates Shaping Enterprise Strategy in 2024, 2024.
48. OpenAI Says It's Charting a "Path to AGI" with Its next Frontier AI Model. https://www.itpro.com/technology/artificial-intelligence/openai-says-its-charting-a-path-to-agi-with-its-next-frontier-ai-model, 2024.
49. Institute (USAII®), U.S.A.I. ChatGPTs Operator Mode A Significant Step Toward AGI in 2025. https://www.usaii.org/ai-insights/chatgpts-operator-mode-a-significant-step-toward-agi-in-2025.
50. April 3, R.R.; 2025. DeepMind Warns of AGI Risk, Calls for Urgent Safety Measures. https://www.bankinfosecurity.com/deepmind-warns-agi-risk-calls-for-urgent-safety-measures-a-27917.
51. Most Read 500B Stargate AI Infrastructure Project Launched for Future of Technology Deloitte Survey: Businesses Show Tempered Optimism on Generative AI. https://aibusiness.com/data-centres/most-read-500b-stargate-ai-infrastructure-project-launched-for-future-of-technology-deloitte-survey-businesses-show-tempered-optimism-on-generative-ai.
52. by AI, B.L.|.T. AI Development up to 2025: Practice, Challenges and Future Trends. https://www.all-about-industries.com/ki-development-2025-practice-challenges-future-trends-a-19e618751db65463d925304491fff94a/, 2025.
53. PricewaterhouseCoopers. AI Rewrites the Playbook Is Your Business Strategy Keeping Pace? https://www.pwc.com/us/en/tech-effect/ai-analytics/ai-business-strategy.html.
54. How The Emergence Of AGI Is Redefining Startups. https://inc42.com/resources/how-the-emergence-of-agi-is-redefining-startups/.
55. 7 Reasons Why AGI Is Reshaping the Future of AI and Innovation Turing. https://www.turing.com/blog/7-reasons-why-agi-is-reshaping-the-future.
56. AI Took Giant Strides in 2024, as AGI Comes into View. https://cointelegraph.com/news/ai-took-giant-strides-2024-agi-comes-into-view, 2024.
57. Costa, L.D. GenAI Not Magic Wand But Can Transform Your Busines, 2024.

58. Team, T.E. Understanding The Difference Between AGI And Generative AI. https://www.techdogs.com/td-articles/trending-stories/understanding-the-difference-between-agi-and-generative-ai.
59. Nangare, S. Replicating Human Attitudes and Behaviors through Generative Agent Simulation, 2025.
60. Basheer, K.C.S. March 2025 GenAI Launches: Are We on The Brink of AGI?, 2025.
61. Artificial Specialized Intelligence The Key to Safe and Scalable Business AI Kognitos AI Automation. https://www.kognitos.com/blog/artificial-specialized-intelligence-the-key-to-safe-and-scalable-business-ai/.
62. Evdokimov, A. AGI Agents Pose Risks How Can We Mitigate Them? https://ai.gopubby.com/agi-agents-pose-risks-how-can-we-mitigate-them-9ace91bb3319, 2025.
63. Agentic AI Discriminative Confused. https://www.linkedin.com/pulse/genai-agentic-ai-discriminative-confused-heres-nagaraju-kancherla-xltac/.
64. Agentic AI vs AGI. https://www.linkedin.com/pulse/agentic-ai-vs-agi-whats-difference-swapnil-amin-5ctoc/.
65. Artificial General Intelligence The Future of Finance and Daily Work Practices | LinkedIn. https://www.linkedin.com/pulse/artificial-general-intelligence-future-finance-daily-work-sahdev-uexlc/.
66. Difference between AGI vs AI. https://www.geeksforgeeks.org/difference-between-agi-vs-ai/, 2025.
67. staff. Toward AGI AI Innovation Will Be Driven by Applications, Not LLMs, 2025.
68. The Race Toward Artificial General Intelligence (AGI): Progress, Skepticism, and Real-World Focus - FinTech Weekly. https://www.fintechweekly.com/magazine/articles/race-toward-artificial-general-intelligence-agi, 2025.
69. What Is AGI? Artificial General Intelligence Explained AWS. https://aws.amazon.com/what-is/artificial-general-intelligence/.
70. Narrow AI vs. General AI vs. Super AI. https://www.spiceworks.com/tech/artificial-intelligence/articles/narrow-general-super-ai-difference/.
71. What Is Artificial General Intelligence (AGI)? | DigitalOcean. https://www.digitalocean.com/resources/articles/artificial-general-intelligence-agi.
72. What Is General Artificial Intelligence (AI)? Definition, Challenges, and Trends Spiceworks.
73. Fetch.Ai Build. Discover Transact. https://fetch.ai/blog/definition-of-artificial-general-intelligence-agi-how-it-works.
74. What Is AGI? Artificial General Intelligence Explained.
75. McKinsey Explainers McKinsey Company. https://www.mckinsey.com/featured-insights/mckinsey-explainers.
76. Framework for AGI Building Towards the Future of Artificial General Intelligence – Quantilus Innovation.
77. BytePlus Business Growth through Superior Technology. https://www.byteplus.com/en/topic/502841?title=.
78. Finance Manager AGI Finance, 2025.
79. Senior Financial Analyst, Alexa Artificial General Intelligence (AGI Finance) Amazon WCT-FCT Job Board. https://careers.wct-fct.com/companies/amazon-3-60ad394d-c673-4474-9694-344b0cae748f/jobs/36356469-senior-financial-analyst-alexa-artificial-general-intelligence-agi-finance.
80. Mocle, A. Artificial General Intelligence: What Are We Investing In? TechPolicy.Press. https://techpolicy.press/artificial-general-intelligence-what-are-we-investing-in, 2025.
81. Torres, J. Chinas AI Strategy Adoption Over AGI, 2025.
82. The Impact of AGI in Business Just Think AI. https://www.justthink.ai/artificial-general-intelligence/the-impact-of-artificial-general-intelligence-in-business-and-industry.
83. The Paradox of Personalised Recommendations.
84. What Is Artificial General Intelligence (Agi). https://fastercapital.com/keyword/what-is-artificial-general-intelligence-(agi).html.
85. What Is General AI? | IxDF. https://www.interaction-design.org/literature/topics/general-ai.
86. Victor, A. All About Artificial General Intelligence The Next Frontier in AI. https://insights.daffodilsw.com/blog/all-about-artificial-general-intelligence-the-next-frontier-in-ai.
87. Wang, P.; Goertzel, B. Introduction Aspects of Artificial General Intelligence.
88. Zohuri, B.; Rahmani, F.M. Artificial General Intelligence (Agi). *5*.
89. min read, S.I.p.l.. Artificial General Intelligence [AGI] Market Size to Reach USD 52 Billion by 2032, Driven by Breakthroughs in Machine Learning and Industry Adoption | Research by SNS Insider. https://finance.yahoo.com/news/artificial-general-intelligence-agi-market-144400151.html, 2024.

90. What Is Artificial General Intelligence (AGI)? https://www.threatdown.com/glossary/what-is-artificial-general-intelligence-agi/, 2025.
91. Artificial General Intelligence (AGI).
92. Understanding Artificial General Intelligence and Its Practical Use Cases. https://www.b12.io/resource-center/ai-how-to-guides/understanding-artificial-general-intelligence-and-its-practical-use-cases.html.
93. Bookmarks US vs. China the Hybrid Game of AI Infrastructure. https://www.rcrwireless.com/20250509/opinion/ai-us-vs-china.
94. AGI vs ASI Understanding the Fundamental Differences Between Artificial General Intelligence and Artificial Superintelligence. https://www.netguru.com/blog/agi-vs-asi.
95. Bryan, D. The Future of AI What Is AGI? AI vs AGI vs ASI | GPT-5 AGI & OpenAI's 'O1'. https://opace.agency/blog/future-of-ai-agi-gpt-5-openai-o1, 2024.
96. Goldman, S. Sam Altman Urges Lawmakers against Regulations That Could 'slow down' U.S. in AI Race against China. https://fortune.com/2025/05/08/sam-altman-openai-senate-hearing-testimony-china-ai-regulations/.
97. Team, T.E. What Is Artificial General Intelligence (AGI) And Should You Be Worried? https://www.techdogs.com/td-articles/trending-stories/what-is-artificial-general-intelligence-agi-and-should-you-be-worried.
98. AGI in Finance Predicting Market Trends with Intelligent Algorithms. https://fastercapital.com/content/AGI-in-Finance--Predicting-Market-Trends-with-Intelligent-Algorithms.html.
99. Blaszczyk, M. The Future of Generative AI in the Financial Sector, 2024.
100. How Financial Markets Could Predict the Arrival of Artificial General Intelligence.
101. Schwarzstein, S. Reshaping the Financial Industry with AGI TrueAGI, 2023.
102. This Is How Artificial General Intelligence Will Drive Financial Inclusion in Latin America. https://www.weforum.org/stories/2024/01/ai-is-driving-the-evolution-of-a-more-inclusive-financial-sector-in-latin-america-here-is-how/, 2024.
103. PYMNTS. What Is Artificial General Intelligence and Why It Matters to Business, 2025.
104. Post, S. The Secret to Successful AI in Hiring? Stop Overthinking It. https://www.businessinsider.com/sc/how-to-stop-worrying-about-ai.
105. Finance Manager Artificial General Intelligence (AGI). https://www.amazon.jobs/en/jobs/2807477/finance-manager-artificial-general-intelligence-agi.
106. link, C.; Email.; X.; LinkedIn.; Facebook.; Line.; Reddit.; QZone.; Weibo, S.; WeChat.; et al. AWS AI Agentic AI Call for Proposals Spring 2025. https://www.amazon.science/research-awards/call-for-proposals/aws-ai-agentic-ai-call-for-proposals-spring-2025, 2025.
107. Simon, C. Artificial General Intelligence (AGI) AIs Next Phase, 2023.
108. Post, L.G. The Road towards Artificial General Intelligence (AGI), 2025.
109. How to Learn AI From Scratch in 2025 A Complete Expert Guide | DataCamp. https://www.datacamp.com/blog/how-to-learn-ai.
110. Artificial Intelligence (AI) Artificial General Intelligence (AGI) and Online Master of Business Administration (MBA) Programs in the USA | LinkedIn. https://www.linkedin.com/pulse/artificial-intelligence-ai-general-ryaye/.
111. Singh, P. What Do Top Leaders Have to Say About Agentic AI?, 2024.
112. OpenAI Has Developed a Scale to Assess How Close We Are to AGI.
113. Exploring Artificial General Intelligence The Future of AI Unveiled, 2024.
114. Beyond ChatGPT The 5 Toughest Challenges On The Path To AGI | Bernard Marr. https://bernardmarr.com/beyond-chatgpt-the-5-toughest-challenges-on-the-path-to-agi/.

 doi:10.20944/preprints202505.0846.v1



115. Jadhav, B. What Are AI Agents? How They Work in 2025, 2024.
116. AI Pulse The Good from AI and the Promise of Agentic. https://www.trendmicro.com/en_us/research/24/l/good-agentic-ai.html, 2024.