

# Engineering and Generative AI: A Perfect Match

Accenture highlighting significant GenAI benefits

## Key Takeaways

In the 1950s, the press used the term “electronic brain” to describe early work by Alan Turing and others. Since then, researchers have attempted to create thinking technologies—artificial intelligence (AI)—equal to or surpassing the human mind.

Engineering is an ideal domain to apply generative AI (genAI): the engineering discipline rigorously and systematically creates and collaborates on varied information across the product lifecycle from idea through life, creating the raw material, parsed from enterprise and IT-OT systems, that forms the basis of all genAI use cases.

Accenture is applying its business knowledge across multiple industry verticals, with its depth of capabilities acquired from specialist design and engineering firms and considerable skill in genAI to help software-defined product companies, to embed genAI in their offerings, and help their industrial clients to shorten the time to value with this game-changing technology.

Accenture believes the next step is the evolution of domain-specific agents and multi-agent systems, that will collaborate in virtual teams, as prompted by the operator, to solve complex problems.

## Introduction

While the notion of AI has been around since the 1950s, recent developments in generative AI (genAI) offer transformational capabilities across a wide range of industries and use cases. genAI and engineering are a perfect match. The engineering disciplines systematically gathers and leverages knowledge in the pursuit of a shared goal. GenAI consumes knowledge, creating new insights, intellectual property, and information. GenAI capabilities can bring that intelligence to the point of work, to enhance existing engineering workflows and to imagine new ones.<sup>1</sup>

Accenture and its Industry X (digital engineering, manufacturing, and capital projects) practice has invested heavily in understanding the potential of genAI in value creation and is bringing their business and AI knowledge to both industrial companies and the software companies that serve them.

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<sup>1</sup> Research for this paper was partially supported by Accenture.

# Augmented Intelligence: A Business Game Changer

In the 1950s, the press used the term “electronic brain” to describe early work by Alan Turing and others. Since then, researchers have attempted to create thinking technologies—artificial intelligence (AI)—equal to or surpassing the human mind.

The 1960s and 1970s brought expert systems focused on leveraging expert knowledge in complex domains like infectious diseases and organic chemistry. In the 1990s expert systems faded from view as rule-based engines became standard tools in many domains. Many evolutions followed that showed the world how AI could surpass human capabilities. Deep Blue beat world chess champion Garry Kasparov in 1997. In 2011, IBM Watson bested human champions at Jeopardy, a popular US game show. IBM Watson is important to the AI story because it could respond to human speech, process vast data stores, and return answers to questions, some that could not be solved before. These examples are also important because they raised awareness of AI in the general populace.

Most people don’t realize they interact with AI every day. Many software applications use AI to improve user experience by learning from current and past users. Emails we get from our streaming services recommend new titles based on our viewing habits. One reason Amazon can deliver your heart’s desire so quickly is that machine learning helps pre-position items where they are likely to be ordered.

GenAI emerged in the early 2020s. This new technology also needed to be trained, building out large language models (LLMs) that are used to interpret “prompts” or inputs to the system. These new systems do not need task-specific training as Watson did. GenAI creates new content in text, images, audio, or other media. Figure 1 shows how AI evolved to support different use cases, from diagnostic and predictive to generative AI.

An explosion of genAI applications, quickly followed including ChatGPT, Copilot, and DALL-E, in many cases offering free online access to foundational versions of these apps. By January 2023, ChatGPT was the fastest-growing software application in history.<sup>2</sup> CIMdata believes that people being able to “touch” and interact with these systems helped build a tsunami of interest. Today, many companies have developed public genAI applications, including Anthropic, Cohere, Google, Meta, Microsoft, OpenAI, and Baidu, as well as many smaller firms.

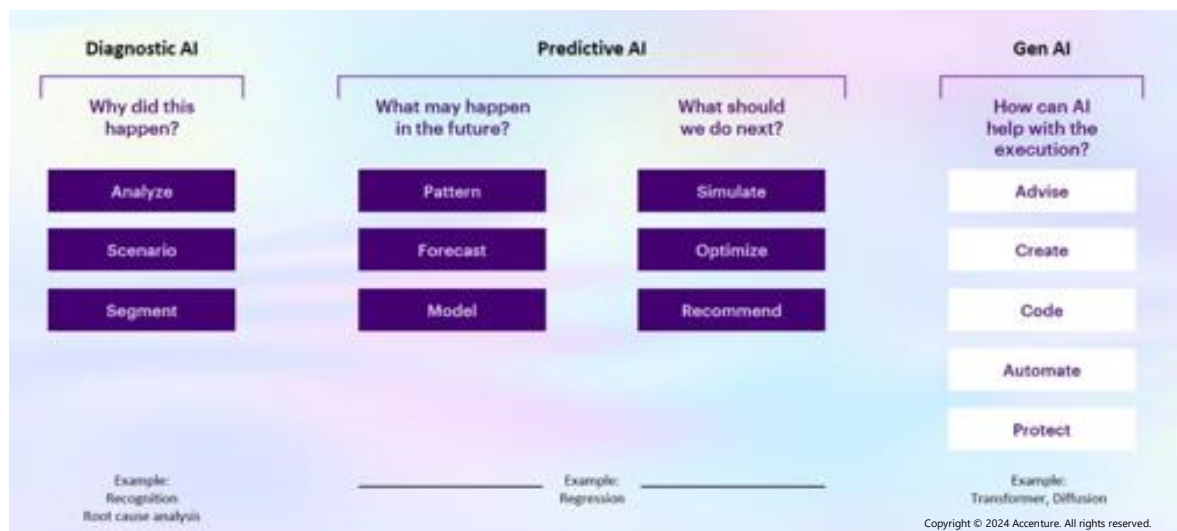


Figure 1—Evolution of Artificial Intelligence  
(Graphic courtesy of Accenture)

<sup>2</sup> <https://www.reuters.com/technology/chatgpt-sets-record-fastest-growing-user-base-analyst-note-2023-02-01/>. It was surpassed by Threads in July 2023.

GenAI can be applied in one of two ways. Some applications are embedding genAI, where the capabilities are built into existing systems that support industrial use cases. AI already infiltrated existing systems, such as ubiquitous chatbots and recommendation engines. Embedded genAI brings these capabilities into users' current workflows and enterprise applications. For example, leading enterprise software companies like Oracle and Microsoft are building these capabilities into their enterprise systems to bring augmented intelligence to the point of work.<sup>3</sup> Extended genAI focuses more on stand-alone systems.

A more recent advancement in genAI is the emergence of retrieval augmented generation (RAG) systems. RAG systems help connect powerful open-source LLMs with an entity's own data through well-crafted prompt engineering. A RAG system works by first retrieving relevant information from external data sources and then generating responses using a pre-trained LLM. Thanks to this architecture, businesses don't need to train an LLM independently. They can easily leverage existing models in the cloud and switch to newer or more suitable versions for specific use cases within minutes. For example, users can feed the RAG system with handbooks, best practices, global engineering standards, and tool manuals to allow access to information about specific questions often found on several different pages, summarized in few words and noting the relevant sources for content used. This provides an explanatory capability that helps build users' trust in their genAI applications.

Experts believe both embedded and extended AI offer game changing value in a range of industries. Industrial firms are taking action. A 2023 Accenture global C-level survey found 97% of executives believe generative AI will transform their enterprises and industries, and will play a major role in their strategies over the next three to five years. Of those, only 31% have already made "significant" investments in their AI initiatives, but 99% plan to amplify their investment in this technology.<sup>4</sup>

## Accenture Shortens Time to Value in GenAI

Accenture is a leading global professional services company with 774,000 people serving clients in more than 120 countries. Their Industry X practice has been the long-time leader in the Systems Integrator segment of CIMdata's global market research on the product lifecycle management (PLM) market. Accenture can create impact for their clients from the "top floor" in the C-suite down to the shop floor bringing new concepts, processes, and technology to help clients optimize their operations, grow revenues, and improve services. For example, Accenture teamed with BMW to build a genAI platform to help answer complex questions across functions and use cases. BMW claimed a 30-40% productivity improvement using this new capability.<sup>5</sup>

Accenture believes that genAI is revolutionary because of its ability to create new content and interact with humans. In addition, Generative AI can leverage sources beyond the knowledge or reach of their human "partners." With their significant investment in genAI, Accenture is well positioned to enhance the PLM "experience" of both independent software vendors (ISVs) and their industrial clientele.

Figure 2 highlights how Accenture is supporting both embedded and extended AI with both ISVs and industrial clients. Accenture helped Dassault Systèmes and PTC, two of the world's leading PLM solution providers, leverage genAI to reduce product development time, improve requirements quality, and orchestrate engineering tool interactions. Their work with industrial clients illustrates the significant benefits that are possible, exciting results for such early applications of genAI.

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<sup>3</sup> CIMdata uses "augmented intelligence" to describe the various ways that AI capabilities are brought to the point of work.

<sup>4</sup> Accenture Pulse of Change Quarterly C-suite survey, October 2023, <https://www.accenture.com/content/dam/accenture/final/accenture-com/document-2/Accenture-reinvention-in-the-age-of-generative-AI-executive-summary.pdf>.

<sup>5</sup> <https://www.accenture.com/us-en/case-studies/automotive/bmw-puts-generative-ai-in-the-drivers-seat>

According to Accenture, many of their clients are using LLMs and RAG. Beyond just the technology, they look to Accenture to help them overcome internal barriers to adoption, helping early adoption to scale across the enterprise, and addressing complexities resulting from genAI, such as cybercrime, safeguarding, quality scores, and compliance and regulatory. This is important because that same Accenture survey did raise some caveats. 76% saw genAI as more of an opportunity than a threat and 72% are cautiously investing due to concerns about its responsible use. Accenture is well positioned to help clients navigate these thorny issues.

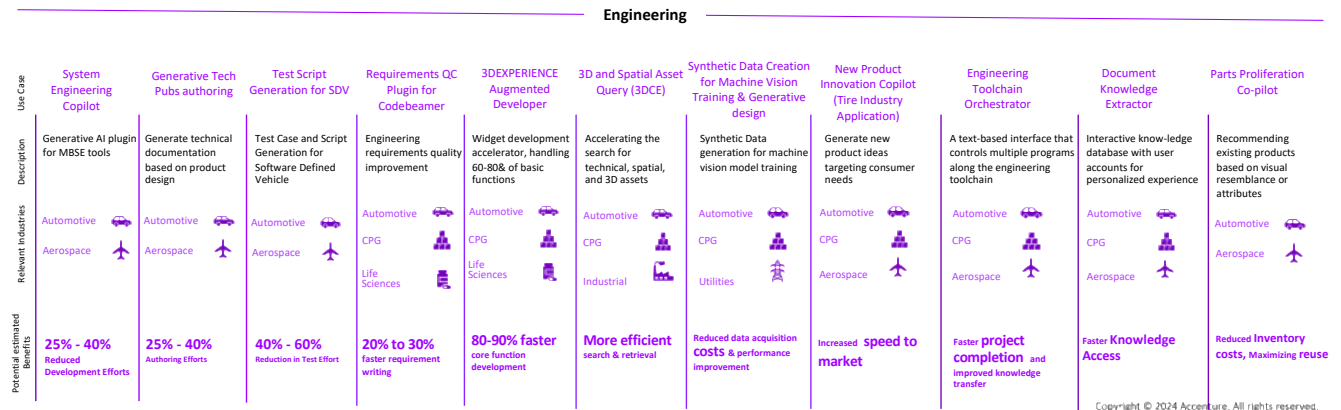


Figure 2—Early Industrial Applications of genAI Enabled by Accenture (Graphic courtesy of Accenture)

These early strong results show how genAI can help improve decision-making, reduce time to market, improve quality and consistency, and make existing human resources more effective (while reducing the need for more skilled team members, an age-old problem in industry). These results are impressive but they are only the beginning. Accenture believes the next step is domain-specific agent and multi-agent systems. Figure 3 shows Accenture’s vision for the future of generative AI agents.

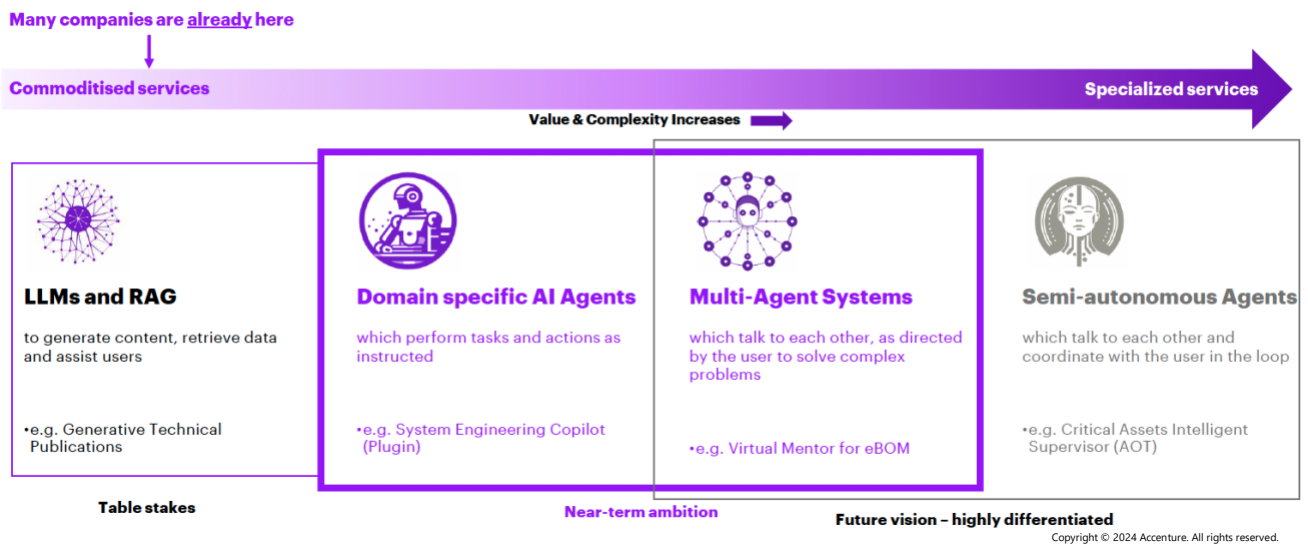


Figure 3—The Future of Generative Agents (Graphic courtesy of Accenture)

This multi-agent approach makes sense. Human organizations are functionally differentiated and work together in teams. Multi-agent systems will collaborate in virtual teams, as directed by the user, to solve complex problems. For example, Boomi, an Accenture partner, uses an agentic approach to build enterprise application integrations.<sup>6</sup>

<sup>6</sup> <https://boomi.com/platform/ai/>

Multi-agent systems are an important change but not a simple one. Organizations will have to determine the right combination of agents and humans, and humans will have to develop new skills to optimize their use of genAI. Market leaders in all industries need to understand how best to apply genAI to their most pressing business challenges. Accenture's research shows that business leaders are heeding the call to action and Accenture stands ready to help them reap the benefits that genAI can provide.

## Conclusion

Artificial intelligence was conceived by early software leaders in the 1940s, and successive generations of technical talent have brought that dream to fruition in genAI. Industrial companies are starting to invest and their ISV and services partners working side by side to help them be successful. Engineering provides a rich set of information to train genAI to help it be successful augmenting the skills of its human partners. Accenture is at the forefront of the genAI revolution. By establishing global genAI centers and collaborating with their ecosystem partners, Accenture is helping shape the future of engineering and driving transformation across the entire value chain. As shown in this Commentary, early investments brought strong returns which will help encourage others to act. Agentic systems appear to be the future, with teams of agents and humans collaborating to push the boundaries of what is possible. These early applications on PLM use cases are just the beginning. CIMdata looks forward to seeing how multi-agent systems will improve product lifecycle management from idea through life.

## About CIMdata

CIMdata, a global strategic management consulting firm, provides services designed to maximize an enterprise's ability to design, deliver, and support innovative products and services. For more than forty years, CIMdata has provided industrial organizations, providers of digital technologies and services, and investment firms with world-class insight, expertise, and best-practice methods on a broad set of product lifecycle management (PLM) topics and the digital transformation they enable. CIMdata also offers research, subscription services, publications, and education through certificate programs and international conferences. To learn more, visit [www.CIMdata.com](http://www.CIMdata.com) or email [info@CIMdata.com](mailto:info@CIMdata.com).