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Automotive & Assembly Practice

Empowering advanced industries with agentic AI

For manufacturers, logistics leaders, and industrial firms, the agentic AI opportunity is no longer theoretical—it's unfolding in real time.

This article is a collaborative effort by Sören Jautelat, with Jens Niemann, Johannes Barg, Patrick Wollner, Peter Cholewinski, Sarah Kühne, and Vincent Steinweg, representing views from McKinsey's Automotive & Assembly Practice.
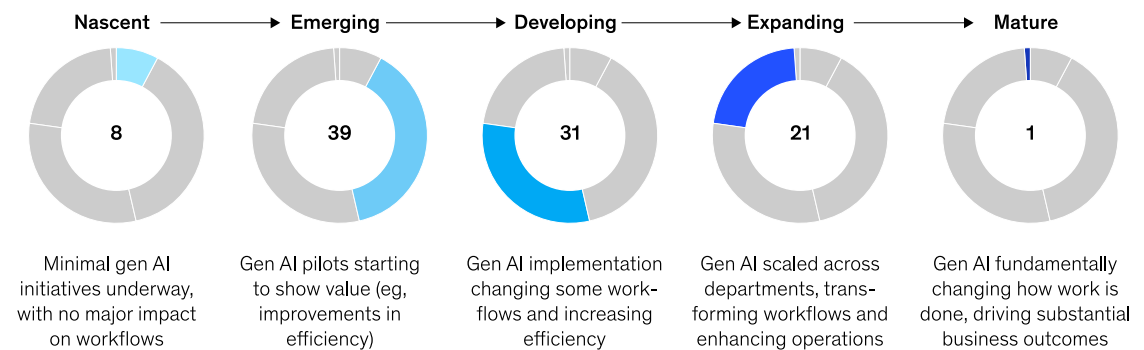
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In recent months, the conversation around technological transformation has centered on agentic AI, and for good reason. Capable of perceiving context, reasoning through complex and multistep challenges, and acting independently across digital systems, AI agents represent the next wave of artificial intelligence, with the potential to solve the "gen AI paradox"—the fact that while many companies are adopting gen AI, few are achieving significant bottom-line impact from its use (Exhibit 1). What differentiates agentic AI from prior automation waves is its potential to allow organizations to fundamentally rethink the way core processes are designed, executed, and governed. From quality inspection and R&D to sales and customer engagement, agents have the potential to deliver tangible and measurable impact by boosting productivity, accelerating innovation, and creating new pathways to growth.

Of course, realizing agentic impact involves more than technology deployment. It calls for bold strategic intent, cross-functional integration, and a deliberate redesign of workflows, talent models, and governance structures. This article explores how advanced industries are beginning to realize that promise—providing a blueprint of what it takes to lead in the age of autonomous agents and unlock new opportunities for growth, innovation, and competitive advantage.

Exhibit 1

More than 90 percent of companies have implemented gen AI, but only 1 percent say the technology is fundamentally changing their business.

Level of gen AI maturity, % (n = 118)

Nascent →	Emerging →	Developing →	Expanding →	Mature
8	39	31	21	1
Minimal gen AI initiatives underway, with no major impact on workflows	Gen AI pilots starting to show value (eg, improvements in efficiency)	Gen AI implementation changing some work-flows and increasing efficiency	Gen AI scaled across departments, trans-forming workflows and enhancing operations	Gen AI fundamentally changing how work is done, driving substantial business outcomes

Source: McKinsey US CXO Survey, Oct–Nov 2024

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Agentic AI in advanced industries: What is the opportunity?
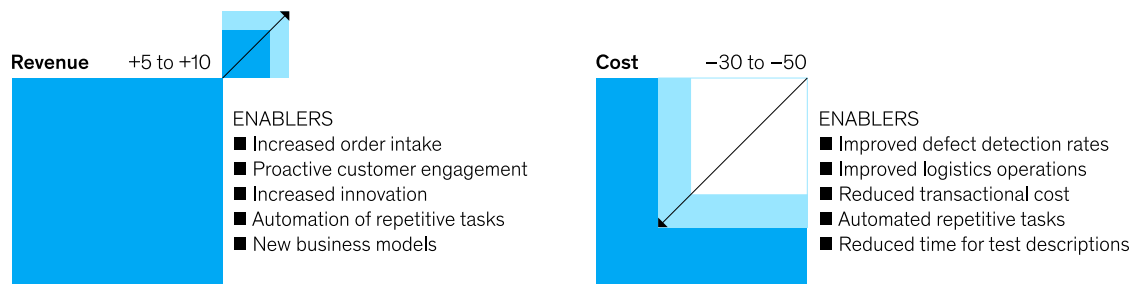
A growing number of leading manufacturers, logistics operators, and energy players have begun using agentic AI, and many are seeing tangible, quantifiable impacts. Manufacturers have reported improved defect-detection rates thanks to automated visual-anomaly detection systems. Logistics operations have increased in efficiency through autonomous routing and scheduling, in some cases leading to a more than 20 percent drop in inventory and logistic costs, according to McKinsey research. And transactional cycle times have been reduced from days to hours or even minutes with intelligent workflow agents, such as those used in documentation efforts.

These early successes illustrate the transformative potential of agentic AI, which is projected to deliver significant financial and operational benefits across industries. According to McKinsey research, agentic AI has the potential to generate $450 billion to $650 billion in additional annual revenue by 2030, representing a 5 to 10 percent revenue uplift in advanced industries, such as automotive. At the same time, cost savings could range from 30 to 50 percent, driven by automation of repetitive tasks and streamlined operations (Exhibit 2).

Exhibit 2

Deploying agentic AI in advanced industries has the potential to boost revenue and cut costs.

Potential AI effects on global auto industry company revenues and costs by 2030, %

Revenue   +5 to +10

ENABLERS
- Increased order intake
- Proactive customer engagement
- Increased innovation
- Automation of repetitive tasks
- New business models

Cost   −30 to −50

ENABLERS
- Improved defect detection rates
- Improved logistics operations
- Reduced transactional cost
- Automated repetitive tasks
- Reduced time for test descriptions

Source: McKinsey US CxO survey, Oct-Nov 2024

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Several factors are unlocking the potential of agentic AI: recent breakthroughs in large language models, which now demonstrate advanced reasoning capabilities; APIs that enable seamless integration of AI agents into complex enterprise systems; and the growing availability of GPU (graphical processing unit) infrastructure, which is designed to handle the intensive computations required for AI capabilities. These technological leaps have propelled AI beyond traditional analytical and generative capabilities, enabling agentic systems to autonomously pursue goals, make decisions, and execute tasks with minimal human intervention.

In the advanced industries sector, these developments are driving three core capabilities:

— *Automation.* Thanks to the ability to independently analyze data, reason, and execute actions, agentic AI reduces the amount of time human workers spend on manual, repetitive tasks—such as data entry, software quality assurance, and routine compliance. (Some banks, for example, have already seen productivity gains of as much as 60 percent.) Unlike traditional automation tools, agents dynamically adapt to changing conditions and integrate seamlessly into workflows, freeing employees to focus on strategic and creative work, potentially enhancing both efficiency and job satisfaction.

— *Quality control and safety.* Operating on a 24/7 basis, agents can provide continuous monitoring, catching anomalies, fraud, and failures earlier than periodic human checks. In sectors where uptime, compliance, and brand trust are nonnegotiable, this capability is already proving decisive.

— *Innovation.* From scanning scientific literature to optimizing R&D test scenarios, agents compress weeks of manual effort into hours—making experimentation faster, cheaper, and more scalable.

The bottom line: Agentic AI is not just a productivity tool. It is a new revenue engine—a strategic lever that could reshape cost structures, organizational models, and leadership KPIs. By automating workflows, enhancing quality control, and driving innovation, agentic AI enables companies to reengineer end-to-end processes, supporting new business models, such as outcome-based contracts and performance as a service. First movers stand to create lasting differentiation in markets where speed, intelligence, and adaptability are increasingly nonnegotiable (Exhibit 3).
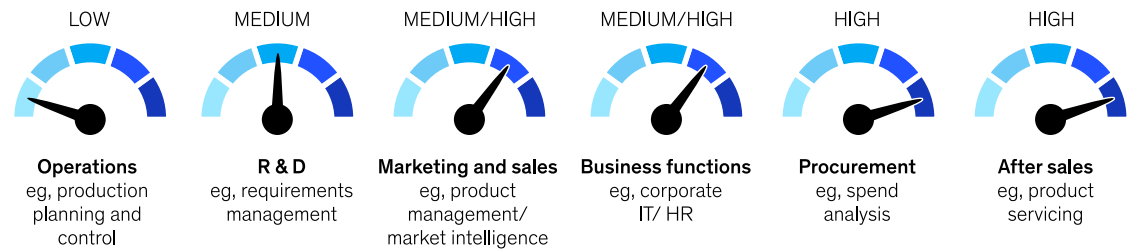
Agentic AI in the field: Two case examples

The capabilities described above may sound like science fiction. But early movers are already realizing significant gains through agentic systems. Below are two examples illustrating the form these first-generation deployments are taking.

Exhibit 3

Agentic AI offers value-creating opportunities in functions across the value chain.

AI-powered impact uplift across the operations value chain, % (illustrative, next 2–3 years)

LOW	MEDIUM	MEDIUM/HIGH	MEDIUM/HIGH	HIGH	HIGH
Operations eg, production planning and control	**R & D** eg, requirements management	**Marketing and sales** eg, product management/ market intelligence	**Business functions** eg, corporate IT/ HR	**Procurement** eg, spend analysis	**After sales** eg, product servicing

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An automotive supplier reimagines research and development

The problem. A leading tier-one automotive supplier routinely manages hundreds of complex, "hardware-near" requirements across multiple concurrent projects annually. Ensuring accurate implementation demands a significant amount of testing, particularly in the development of detailed test case descriptions—encompassing scenarios, parameters, acceptance criteria, and procedural guidelines—as well as subsequent executable test scripts. This process was highly manual and labor intensive. Engineers carefully reviewed each new requirement, identifying and assessing similarities to historical cases, extracting relevant elements from previous test descriptions, and meticulously compiling a comprehensive and coherent new test description—a process that often took 30 minutes to three to four hours per requirement, especially when performed by less experienced team members.

The agentic solution. Recognizing the opportunity for efficiency and effectiveness gains, the company turned to agentic AI. It began by clearly delineating the existing manual workflow into a series of discrete, agent-friendly process steps. Leveraging a frontier large language model alongside LangGraph, an open-source agentic framework, the supplier developed and deployed a specialized squad of AI agents specifically trained to navigate its extensive database of historical requirements and corresponding test descriptions. Intelligently synthesizing and adapting relevant historical data, the system allowed the company to automate the generation of initial test case descriptions for incoming requirements.

The impact has been significant. The supplier has seen strong productivity improvements, particularly for junior or less experienced engineers, who are benefiting greatly from the agents'

ability to swiftly generate accurate test descriptions, with some requirement types now taking 50 percent less time. This has allowed engineers to dedicate more attention and resources to complex tasks requiring human creativity and critical analysis, which has enhanced overall process efficiency and quality.

Notably, despite evaluating various commercially available solutions, the supplier opted for a custom implementation. This bespoke system, developed and implemented within just a few weeks, provided superior integration and efficiency compared with off-the-shelf market alternatives, which often required cumbersome adaptations. The company also learned some important lessons about the limitations of agents. Its agentic system, for example, demonstrated considerable proficiency with requirements that had clear parallels in historical data. But it sometimes struggled when confronted with novel scenarios lacking historical analogues; to address the issue, the company inserted greater human oversight into such scenarios.

Based on the success of this initial deployment, the company is planning a strategic pivot toward broader "agentification" of R&D and engineering workflows, envisioning an ecosystem in which intelligent agents handle increasingly complex and interconnected tasks. This approach promises not only substantial operational efficiency improvements but also a new paradigm in engineering productivity, fostering innovation and enhancing overall competitive advantage in a rapidly evolving automotive industry.

A truck OEM reinvents its approach to sales
The problem. A manufacturer of truck original equipment faced challenges in growing market share, largely due to a sales force historically focused on serving existing customers. At issue was whether agentic AI could fundamentally revamp the company's sales process to enhance prospecting activities.

The agentic solution. The company created a multiagent system that mirrors and automates several crucial tasks traditionally undertaken by sales representatives, starting with identifying prospective companies actively in the market for new trucks. Acting autonomously, the agents conduct comprehensive research to assess the extent to which the OEM's products and services aligned with potential customers' unique requirements. Drawing on diverse and sometimes unconventional data sources—including government-issued licensing applications, company websites, news and media sources, and even data from visual imagery—the system evaluates customer suitability, prioritizing prospects based on factors like financial stability, market attractiveness, and fit-with-product offerings to generate comprehensive and insightful profiles equipped with curated sales arguments, company-specific details, and direct contact information.

The agentic system features multiple specialized agents, each tailored to perform distinct yet interconnected tasks—including verifier, or "critic," agents able to validate the work of research agents for accuracy, reliability, and actionable quality. The company adopted a highly collaborative approach to develop the system, actively involving end users—that is, the sales reps themselves—to tailor the functionalities to precisely meet daily needs and operational

realities. Recognizing that technological capability alone would not guarantee success, company leaders also paired the initiative with robust and proactive change management strategies, embedding accountability into the adoption process and closely monitoring utilization to ensure that the generated leads translated effectively into real-world sales actions.

The outcomes were immediate. Within three to six months, the company saw a dramatic surge in sales activity. Prospecting efforts doubled, driving a 40 percent increase in order intake, underscoring the strategic value of agentic AI in not only improving efficiency but also enhancing revenue generation capabilities.

Scaling the impact of agentic AI

These examples are inspiring, but generating meaningful impact from agentic AI requires more than isolated deployments of lighthouse use cases or incremental process improvements. To capture the transformative potential of gen AI, organizations must shift from scattered, tactical efforts to a cohesive, strategic program that fundamentally redesigns how they operate, enabling organizations to move from experimentation to enterprise-wide transformation. This requires innovation across three foundational categories: process, people, and data.

Process: Reimagining end-to-end workflows

Agentic AI delivers the greatest value when it is used for reengineering business domains rather than simply optimizing existing tasks. This demands a shift from thinking in terms of individual use cases to a broader focus on core workflows—mapping the workflows across strategy, execution, and operations. Critical elements, such as expert knowledge, decision logic, and human–system interfaces, must be captured and translated into formats that agents can understand and act on. The result is a redefined process architecture in which agents enable more adaptive, automated, and outcome-oriented operations.

To ensure these redesigned workflows generate meaningful impact, organizations need to quantify the financial and operational benefits of their agentic AI deployments—such as cost reductions, efficiency gains, or revenue enhancements—directly linking these outcomes to the organization's bottom line. By embedding a business-case-driven approach into workflow redesign, companies can ensure that agentic initiatives are not only strategically transformative but also financially viable—an alignment of innovation with tangible business outcomes that creates a clear pathway to profitability and sustained competitive advantage.

Structure, people, and governance: Building a digital workforce

Integrating AI agents requires organizations to rethink how work is structured, similar to the way they design roles for a human workforce. This includes defining agent archetypes (for example, orchestrators versus specialists) and equipping digital workspaces with the tools and capabilities that agents will need to execute their tasks. In addition, organizations should be bold in determining where agentic systems are appropriate. Effective deployment depends on establishing clear accountability, appropriate governance, and collaborative agent-to-agent and human-to-agent interaction models that support trust and oversight.

Technology and data: Developing a scalable AI mesh and ecosystem
A new technical infrastructure—the agentic AI mesh—functions as the orchestration layer that enables complex agent ecosystems to scale effectively, operate safely, and evolve over time. The agentic AI mesh brings together both proprietary and off-the-shelf agents within a unified architecture, allowing them to collaborate, share context, and delegate tasks while accessing enterprise and commercial off-the-shelf systems.

The mesh is built on four key design principles: composability, which allows tools, models, or agents to be added without altering the core system; distributed intelligence, which lets agents coordinate and divide tasks across networks; layered decoupling of logic, memory, orchestration, and interface, which enhances modularity and maintainability; and vendor neutrality, to avoid lock-in by enabling independent technical updates to components. Equally critical is the quality and accessibility of enterprise data. Organizations should shift from use-case-specific pipelines to reusable data products and address gaps in unstructured data to ensure AI agents can operate effectively. Together, these technical and data foundations enable organizations to unlock the full potential of agentic AI at scale.

Effective implementations start small, scale deliberately, and are paired with rigorous risk controls. Agentic AI cannot be treated as a plug-and-play solution. Success depends on clearly scoped, high-value use cases; robust system architectures; and proactive management of risks such as hallucinations, decision boundaries, and cybersecurity threats. Almost universally, organizations achieving the most from agent deployments emphasize the importance of "human-on-the-loop" governance—oversight frameworks in which humans manage, supervise, validate, and intervene when necessary. Such systems are critical as the regulatory landscape evolves. The European Union AI Act and sector-specific standards, for example, are sharpening expectations around accountability, transparency, and risk management. Organizations not only need to move fast; they must move responsibly, balancing innovation with control.

A fundamental inflection point

Agentic AI presents an opportunity for enterprises to fundamentally rethink the way they operate and compete. This emerging digital workforce is always on, increasingly autonomous, and capable of learning and collaborating across systems and domains. Organizations that harness this potential early stand to capture first-mover advantages in efficiency, resilience, and innovation.

But sustainable success with agentic AI will not come from experimentation alone. It requires visionary leadership, investment in scalable foundations, and a willingness to redesign end-to-end value chains around digital agents. Winning this next wave will require more than simply deploying agents. The leaders will be those who reinvent their organizations. The path forward is clear: from pilot to platform, from use case to domain reinvention, and from automation to autonomy.

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