Research Insights

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Shift to enterprise-grade AI for industrial products

How leaders capture the value of artificial intelligence

IBM **Institute for Business Value**

IBM

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Talking points

Industrial products companies are prioritizing artificial intelligence (AI).
More companies are considering the adoption of AI and are focusing on business functions where it can add value. Our research indicates companies will continue to invest in AI, but with more realistic expectations for ROI. Topline, customer satisfaction, and customer retention value drivers are typical objectives of AI implementations.

Outperformers are further along with AI.
Outperformers are organizations that report having outperformed their peers in revenue growth and profitability. They are in more mature phases of their AI journey. Outperformers expect to continue to out-invest their peers in AI.

A different mentality is required to leverage AI.
The outperformers think strategically about digital technologies, including AI. They leverage analytics and AI across the business. Outperformers capitalize on data. They adhere to data governance.

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Realizing the value of AI

AI capabilities are rapidly maturing. More and more industrial products executives are actively determining where and how to leverage AI. But executives are also more discriminating about their organizational priorities for AI and how these leading-edge technologies are rolled out. These CxOs are highly focused on select priority business functions and value drivers for their AI investments. These areas emphasize revenue growth and the customer. And while technology availability was the leading concern for executives in 2016, now it's how to cultivate AI skills, address regulations, and drive buy-in.[1]

So, what do these changes mean? Moving from experimentation to implementation is not straightforward, and many companies are struggling with the transition. However, some businesses are achieving AI at scale successfully—and they are disproportionately outperforming financially. Adopting AI as part of a broader digital reinvention play, pinpointing AI investments, and developing capabilities are critical to realizing value in the enterprise.

In 2018, the IBM Institute for Business Value partnered with Oxford Economics to survey C-level executives and top functional leaders about AI and cognitive computing. (For more about the research, see the "Study approach and methodology section," on page 9.) To understand industrial products executives' considerations, expectations, and objectives in applying AI, we examined the responses of 250 executives in the industry who participated in a study of more than 5,000 global executives. This report explores how industrial products organizational views on AI have evolved over the past two years and how a set of outperformers are achieving advantages with AI.

State of AI

In 2016, 77 percent of industrial products enterprises were at least considering AI adoption. Today, the proportion has increased to 88 percent, which is greater than the percentage of cross-industry respondents. And over 30 percent of these industrial products enterprises are currently in the evaluation, pilot, or implementation stage. These companies have tempered their investments

5 distinct
functional priorities indicate a sharper focus for AI

47%
of outperformers view AI as a strategic platform

78%
of outperformers collect and analyze real-time events and data

in AI, expecting to invest 2 percent of their IT spend on AI this year. However, in the next three years, the investment is expected to triple to 6 percent.

Industrial products organizations are discriminating about which business functions they expect will create the most value from AI initiatives. Our recent study data reveals that five functions were selected by a majority of industrial products CxOs. The functions that are critical to industrial products companies, converting customer needs into products and optimizing production efficiency are:

- information technology (IT)
- innovation
- manufacturing
- product development
- customer service

Four functions were selected by less than a third of the CxOs (see Figure 1). Three of the majority functions are consistent with the 5,000+ cross-industry responses. The other top functions differ from the cross-industry selections.

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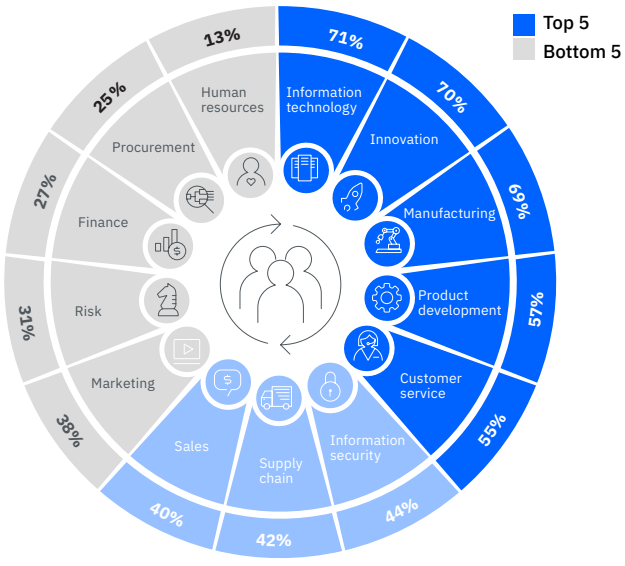
Figure 1

Functions where AI provides the most value

Percentage of of industrial products CxO respondents who say cognitive computing would add value



Source: IBM Institute for Business Value survey on AI/cognitive computing in collaboration with Oxford Economics. 2018.

Revenue growth, customer satisfaction, and retention are the primary objectives of AI investments.

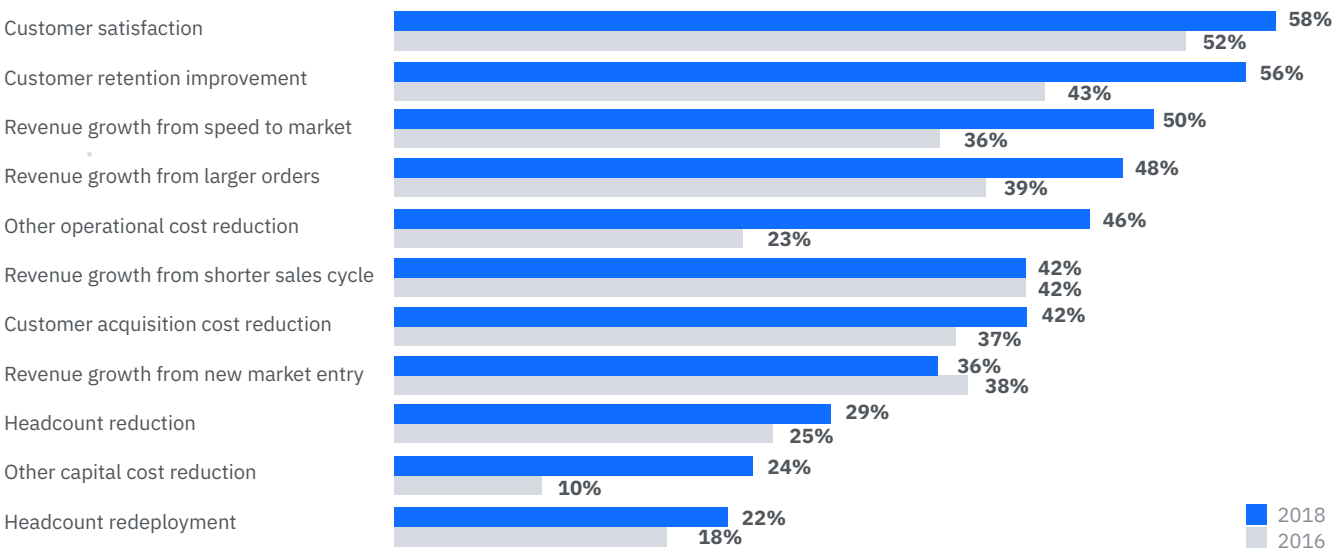
So why are these five functions such high priorities for industrial products organizations? Not only can IT benefit from AI-enabled help desk virtual assistants and process automation, it is also often responsible for the data initiatives needed to support AI and for "getting it done." Innovation involves strategic opportunities, and AI can help identify profitable growth plays. For example, AI can be used to provide insight into real-time customer attitudes and their impact on an enterprise's revenues. In the customer service function, many organizations have piloted virtual assistants. AI can both help deliver a consistent level of production in manufacturing and assist product development by leveraging data on market opportunities to create new products and services.

This is supported by the intensified focus on topline growth over the last two years. Industrial products executives continue to rank revenue growth, customer satisfaction, and retention as primary objectives of their AI investments—significantly above cost considerations (see Figure 2). This is consistent with cross-industry respondents emphasizing customer satisfaction (72 percent) and customer-retention improvement (59 percent). However, industrial products companies have a greater focus on revenue drivers compared with their cross-industry peers. Of course, that does not mean cost is unimportant to industrial products respondents. Anecdotally, many AI projects have a cost-reduction element that underpins the business case.

As illustrated in Figure 3, industrial products executives have shifted their attention from worrying about whether to adopt AI (availability of technology) to struggling with how to adopt AI (skills, regulations, organizational buy-in). These top concerns match three of the four stated by cross-industry executives.

Figure 2

Topline value drivers: 2016 versus 2018



Source: IBM Institute for Business Value survey on AI/cognitive computing in collaboration with Oxford Economics. 2018.

ABB: Using AI to drive better customer service[2]

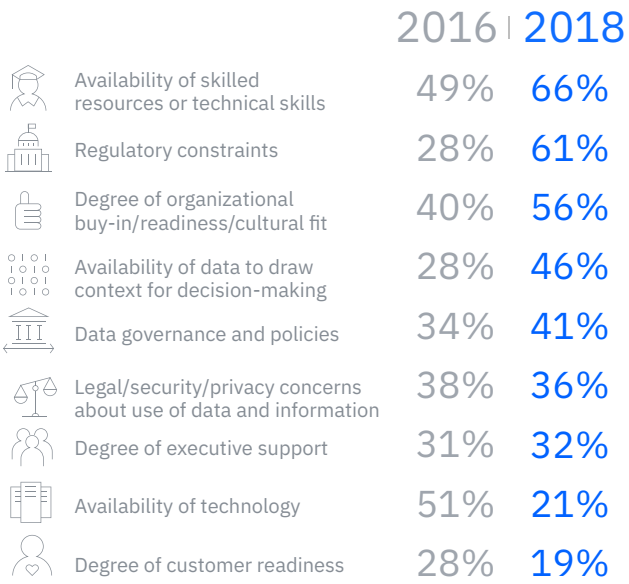
ABB produces power generation, distribution, automation, and consumption equipment. The company houses a plethora of customer comments in multiple languages across many customer care systems. ABB needed a solution to collect, analyze, and translate these comments to identify trends at scale and gain a better understanding of customer needs and perceptions.

Where a pattern in comments written in natural language sentences—but in different languages—is seen, AI can analyze and convert the text into English. Concurrently, natural language understanding capabilities extracts metadata from the content, such as concepts, entities, keywords, categories, relations, and semantic roles to learn and understand sentiment, emotion, and tone.

This information is linked to structured data to map an issue to its root cause. ABB can now build analytical models related to cause-and-effect analysis for better decision-making and productivity.

Figure 3

Barriers in implementing AI: 2016 versus 2018



Source: IBM Institute for Business Value surveys on AI/cognitive computing in collaboration with Oxford Economics. 2016 and 2018.

In fact, 82 percent of the industrial products executives surveyed say AI will have some impact on the demand for skills in the next five years. Without a more sustained focus on developing the skills required, AI initiatives could face a higher risk of delay between proof of concept, pilot, and implementation. And the challenge extends beyond data scientists, AI technologists, and IT professionals. Softer skills, such as collaboration and innovation, can be infused throughout strategy, finance, operations, and all business units.

Forty-two percent of outperformers are either piloting, implementing, or operating AI today.

The outperformers

How can industrial products enterprises capitalize on AI? To help answer this question, we analyzed survey responses and identified a small group of outperformers. These represented 18 percent of our survey population. This group self-reported that it significantly outperformed in revenue compared to competitors and was significantly more efficient and profitable than similar organizations over the past three years. This percentage of industrial products outperformers is consistent with the 20 percent of outperformers from all other industries.

Industrial products outperformers are further along the adoption journey. Forty-two percent of outperformers are either piloting, implementing, or operating AI today, versus 28 percent of all others in the industry. This is similar to the adoption rate of other industries, in which 39 percent of leaders are piloting, implementing, or operating AI.

Industrial products outperformers intend to invest more in AI capabilities. In fact, outperformers say they will invest over 50 percent more than their peers this year (3.2 percent of IT spend versus 2.0 percent). And they expect to more than double that investment in the next three years to 7.5 percent.

Based on these leaders' survey responses, industrial products organizations should strive for a different mentality to take advantage of AI:

- Think strategically about digital technologies.
- Leverage analytics and AI across the business.
- Capitalize on data.
- Set data governance.

Fluor: Delivering predictive analytics capability for megaprojects[3]

Fluor Corporation uses artificial intelligence-based systems to predict, monitor, and measure the status of engineering, procurement, fabrication, and construction megaprojects from start to finish. Large capital projects in energy, mining, and metals markets are incredibly complex. The amount of data and number of people and moving parts involved can change regularly and put schedules and budgets in jeopardy.

To gain insights from project data in nearly real-time, Fluor is developing the EPC Project Health Diagnostics (EPHD) and Market Dynamics/Spend Analytics (MD/SA) systems. These systems can predict delays or rising costs based on historical trends and use this information to assess project status. Fluor can identify the root cause and potential impact of change and use that information in estimate analysis, forecast evaluation, project risk assessment, and critical path analysis.

Different mentality to take advantage of AI

Thinking strategically about digital technologies

Technological disruption in the industrial products industry has increased significantly. The fourth industrial revolution—sometimes referred to as Industry 4.0—is characterized by increasing digitization, motivating businesses to interconnect products, value chains, and business models.

To succeed, industrial products businesses are combining new and emerging digital technologies—including cloud computing, AI, mobile, and the Internet of Things (IoT)—to reconceive customer and partner relationships and operations, such as digitally reinventing their enterprises. Outperformers are further along in thinking about AI in the context of these other technologies. Nearly 40 percent of the outperformers have developed digitization strategies, compared to just under 20 percent of their peers. And these outperformers have made the investments in multiple technologies (see Figure 4).

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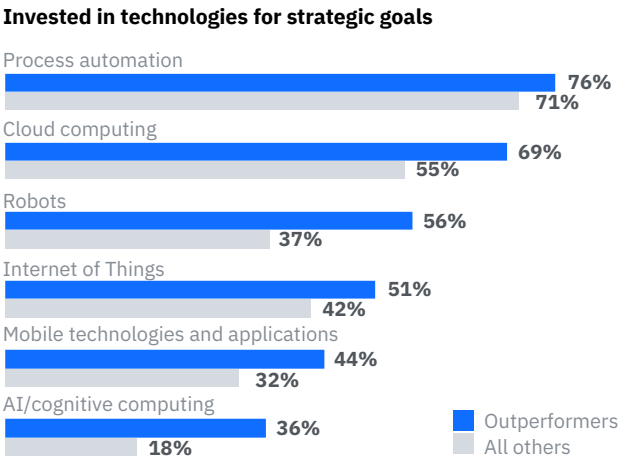
Figure 4

Outperformers embrace technologies at a higher rate



Source: IBM Institute for Business Value survey on AI/cognitive computing in collaboration with Oxford Economics. 2018.

These technologies provide robust data capabilities and infrastructure. Process automation enables production efficiency and operational excellence through integrated automation and information management systems, process history data, as well as process and product tracking. Cloud computing can be used to run applications and store data anywhere. Robots can be used for material handling, assembling, and disassembling. The IoT can connect sensors and devices to networks. Mobile technologies can facilitate ubiquitous access to information. With AI, the potential to expand insights and capabilities of organizations presents tremendous opportunities.

For industrial products companies, data-driven platforms have become an increasingly tangible way to realize the benefits of AI. Strategic platforms powered by AI can predict problems and proactively direct automation to improve quality. A quarter of the industrial products organizations from the most recent IBM Global C-suite Study are investing in the new platform business model.[4] Across all industries, the net impact of this commitment can be estimated at USD 1.2 trillion.[5] Nearly half of the outperformers identified in our research view AI as a strategic platform play. The combination of AI with other emerging technologies, such as cloud computing and IoT, help integrate participants on a platform and support the continuous learning required to succeed. And the digital technologies enable constant roll out of new features in the platform.

Leverage analytics and AI across the business

Many of the outperformers are advancing their overall analytical capabilities to manage their businesses. They are using analytics or AI solutions to manage performance—69 percent compared to 60 percent of their peers. Performance management provides the “blocking and tackling” to run the business by defining the enterprise’s strategy and establishing key metrics to measure progress toward achieving the objectives outlined in the strategy.

More than three quarters of outperformers have increased their velocity of decision making by using real-time events and data.

Outperformers are automating their processes with analytic solutions beyond traditional business process management or basic robotic process automation. They are using unstructured data and/or algorithms and involving multiple types of AI technologies and data discovery. In fact, 58 percent of outperformers are doing so versus 39 percent of all others.

Capitalize on data

The accelerating growth of data is executives' primary challenge. The digital universe will double every two years at least, a 50-fold growth from 2010 to 2020.[6] Organizations are attempting to distill every transaction and every inquiry—even every human interaction—to an essence of 1s and 0s.

So, what is needed to optimize the value of AI? A strong data infrastructure, aligned with business architecture that reflects a company's strategic direction, is essential. Two-thirds of outperformers have applications with direct, streamlined access to all source-system data versus 56 percent of all others. Ninety-eight percent of outperformers have interconnected data platforms through application performance interface (API) frameworks with their internal and external business applications. And they are outpacing their peers—87 percent versus 62 percent—in using subscription models for platform components (for example, cloud, data, analysis). This infrastructure allows them to nimbly respond to new market dynamics, customer demands, strategic initiatives, and user needs.

Outperformers are also tapping into a wide variety of data sources, both internally and externally. More than three quarters of outperformers have increased their velocity of decision making by using real-time events and data. By incorporating this data with their operational data, outperformers have the potential to dramatically improve supply chain efficiency, adjust manufacturing, and manage disruptions.

Set data governance

Outperformers have put in place data governance practices. Because AI and its decisions are grounded in data, the ability to standardize and manage data is crucial for successful operational execution (see Figure 5). Recognizing the importance of metadata for business definition, approved usage, and measured data quality —wrapped around data and interpretable through AI—is fundamental.

Over three-quarters of outperformers have implemented a business data governance system, and over half have common data standards. And over half of outperformers have standard data integration processes and patterns.

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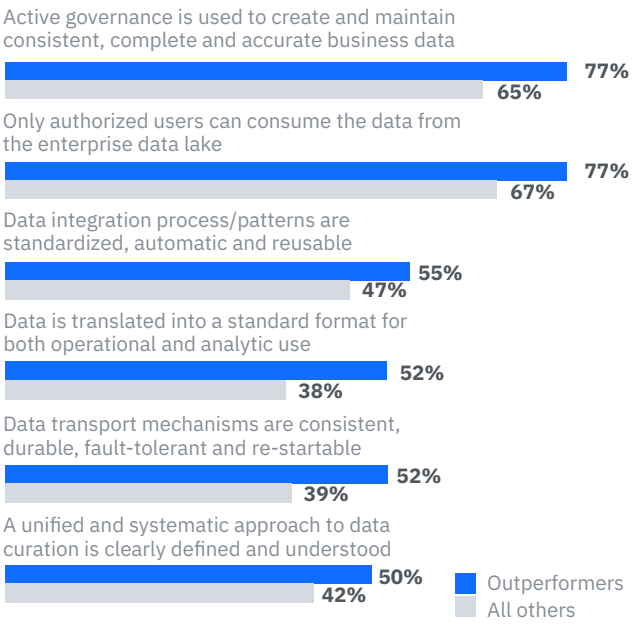
Figure 5

Outperformers create standards for data management



Source: IBM Institute for Business Value survey on AI/cognitive computing in collaboration with Oxford Economics. 2018.

Getting started

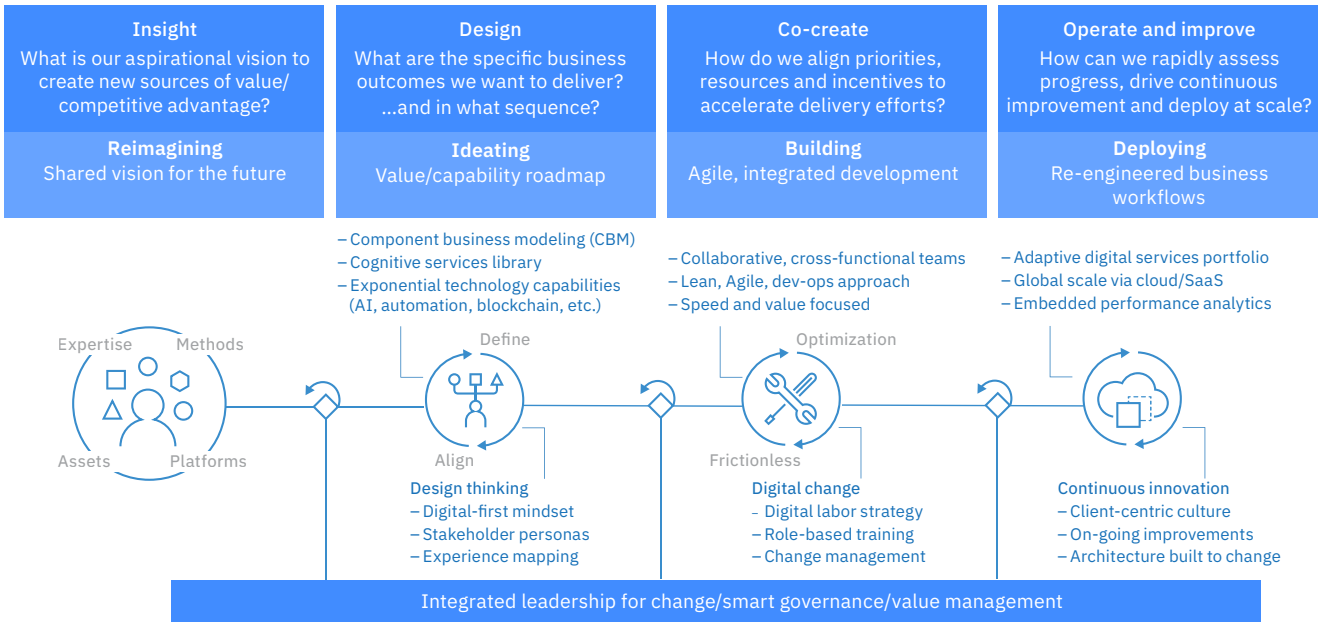
Starting small, failing fast and scaling robustly apply equally to AI as to other areas of successful technology execution.[7] A key example of how to institutionalize the principles of executional agility in practice can be found by examining an innovation platform concept, which we introduced in the IBM Institute for Business Value executive brief "The Cognitive Enterprise: The finance opportunity."[8]

To implement an innovation platform, organizations need to advance through a series of specific steps (see Figure 6). First, define an AI strategy to drive change that includes creating the right governance, operating models, and roadmaps. Create an innovation platform to drive innovation and develop a "factory" to industrialize and scale—both underpinned by an enterprise-wide AI platform.[9]

As explained in "The Cognitive Enterprise: The finance opportunity," an innovation platform can support an organization through a business transformation "inside-out" by aligning to the company's strategic business imperatives. The innovation platform is supported by a governance model that helps make sure that initial outcomes propel adoption across the organization.

Figure 6

Implementation of an innovation platform



Source: Menezes, Tony, and Bob Booth. "The Cognitive Enterprise: The finance opportunity." IBM Institute for Business Value. 2018.

Key questions to consider

- Focus: Which functions are your priority areas for AI, and do they support efficiency, profitable growth, and/or customer satisfaction and retention?
- Value: What are the top value drivers for your organization, and how do you plan to measure AI benefits?
- Data: Who owns and maintains your data, and how strong is your organization's data expertise?

Study approach and methodology

In cooperation with Oxford Economics, the IBM Institute for Business Value surveyed 5,001 global executives representing 18 industries, including leaders of government agencies and educational institutions, and 19 functions. Roles of responding executives included C-level executives — CEOs, CFOs, CHROs, CIOs, CMOs, and COOs — as well as heads of customer service, information security, innovation, manufacturing, risk, procurement, product development, and sales. In total, 250 industrial products respondents participated in the study.

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