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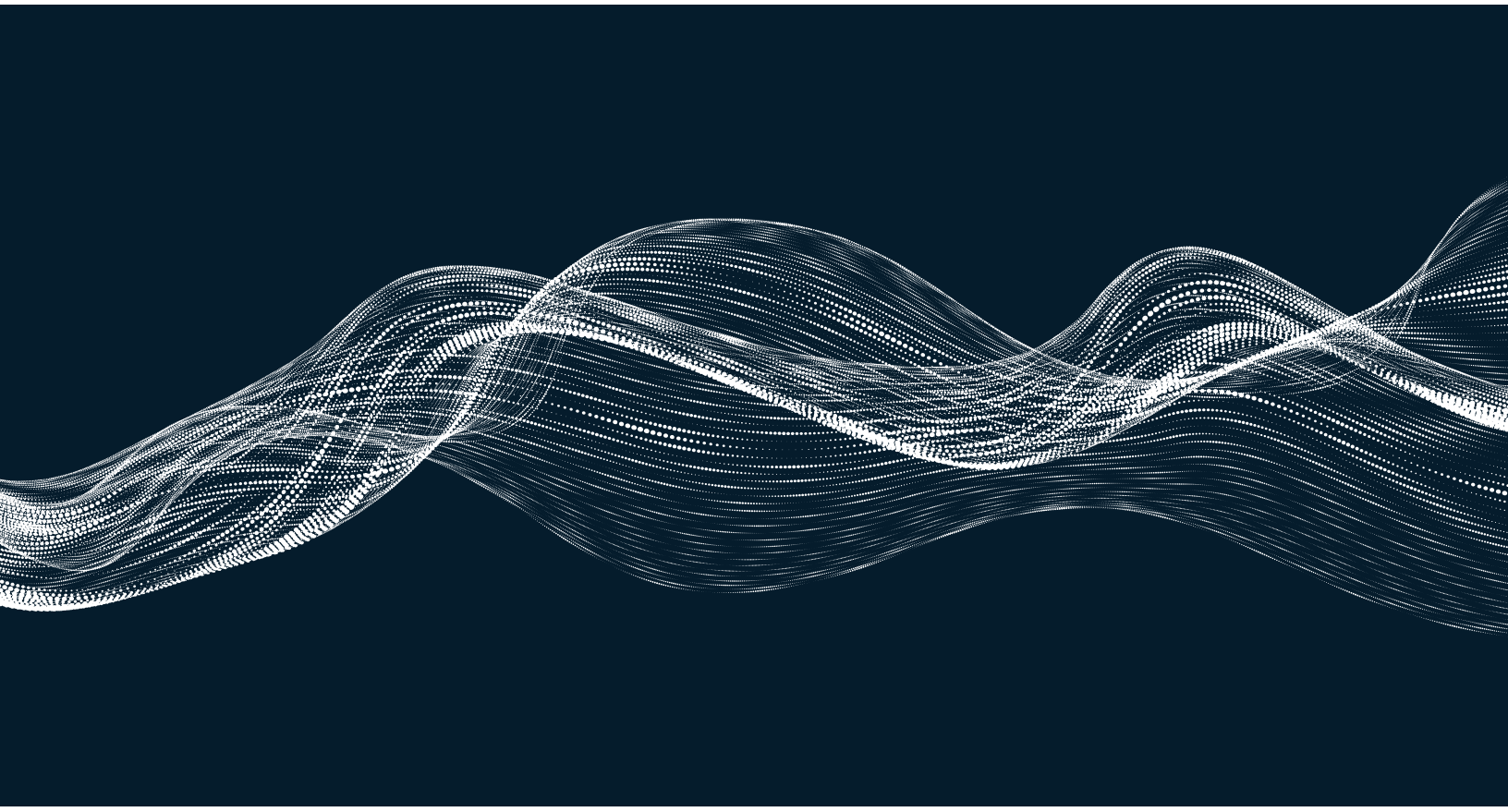
Global AI Survey: AI proves its worth, but few scale impact

Most companies report measurable benefits from AI where it has been deployed; however, much work remains to scale impact, manage risks, and retrain the workforce. A group of high performers shows the way.



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Adoption of artificial intelligence (AI) continues to increase, and the technology is generating returns.[1] The findings of the latest McKinsey Global Survey on the subject show a nearly 25 percent year-over-year increase in the use of AI[2] in standard business processes, with a sizable jump from the past year in companies using AI across multiple areas of their business.[3] A majority of executives whose companies have adopted AI report that it has provided an uptick in revenue in the business areas where it is used, and 44 percent say AI has reduced costs.

The results also show that a small share of companies—from a variety of sectors—are attaining outsize business results from AI, potentially widening the gap between AI power users and adoption laggards. Respondents from these high-performing companies (or AI high performers) report that they achieve greater scale and see both higher revenue increases and greater cost decreases than other companies that use AI.[4] The findings, however, provide a potential road map for laggards, showing that the AI high performers are more likely to apply core practices for using AI to drive value across the organization, mitigate risks associated with the technology, and retrain workers to prepare them for AI adoption.

Further, our results suggest that workforce retraining will need to ramp up. While the findings indicate that AI adoption has generally had modest overall effects on organizations' workforce size in the past year, about one-third of respondents say they expect AI adoption to lead to a decrease in their workforce in the next three years, compared with one-fifth who expect an increase, and AI high performers are doing more retraining.

Most respondents are seeing returns from AI

In this year's survey, we asked respondents about 33 AI use cases across eight business functions, including how adoption of AI for each of these activities has affected revenue and cost in the business units where AI is used. The results suggest that AI is delivering meaningful value to companies.

Aggregating across all of the use cases, 63 percent of respondents report revenue increases from AI adoption in the business units where their companies use AI, with respondents from high performers nearly three times likelier than those from other companies to report revenue gains of more than 10 percent. Respondents are most likely to report

The results suggest that AI is delivering meaningful value to companies.

[1] We define artificial intelligence (AI) as the ability of a machine to perform cognitive functions that we associate with human minds (such as perceiving, reasoning, learning, and problem solving) and to perform physical tasks using cognitive functions (for example, physical robotics, autonomous driving, and manufacturing work).

[2] We define AI use in standard business processes as embedded AI in at least one product or business process for at least one function or business unit.

[3] The online survey was in the field from March 26 to April 5, 2019, and garnered responses from 2,360 participants representing the full range of regions, industries, company sizes, functional specialties, and tenures. Of these respondents, 1,872 work at companies they say have piloted AI in at least one function or business unit, embedded at least one AI capability in at least one product or business process for at least one function or business unit, or embedded at least one AI capability in products or business processes across multiple functions or business units. To adjust for differences in response rates, the data are weighted by the contribution of each respondent's nation to global GDP.

[4] We define an AI high performer as a company that, according to respondents, has adopted AI in five or more business activities (is in the top quartile for the number of activities using AI), seen an average revenue increase of 5 percent or more from AI adoption in the business units where AI is used, and seen an average cost decrease of 5 percent or more from AI adoption in the business units where AI is used. The survey results include 54 respondents from high-performing companies, which is 3 percent of all respondents reporting AI use by their companies.

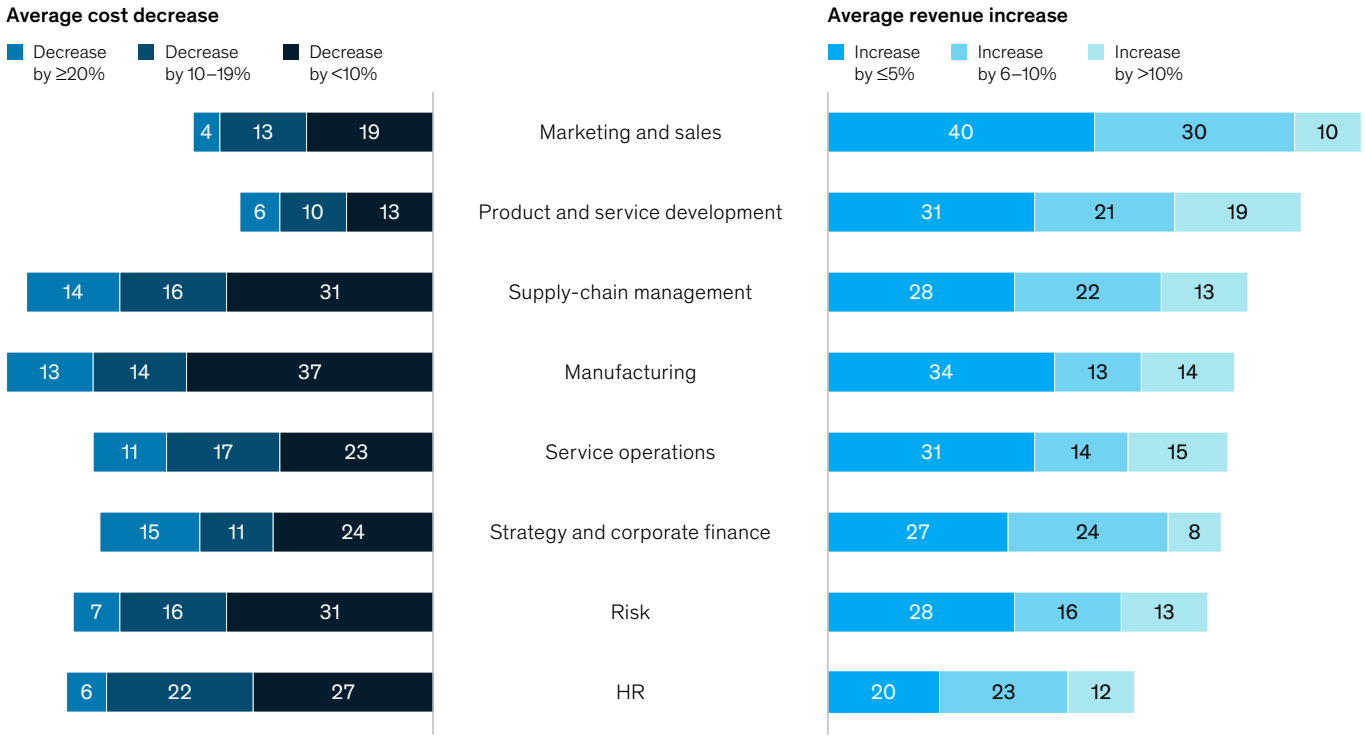
revenue growth from AI use cases in marketing and sales, product and service development, and supply-chain management (Exhibit 1). In marketing and sales, respondents most often report revenue increases from AI use in pricing, prediction of likelihood to buy, and customer-service analytics. In product and service development, revenue-producing use cases include the creation of new AI-based products and new AI-based enhancements. And in supply-chain management, respondents often cite sales and demand forecasting and spend analytics as use cases that generate revenue.

Overall, 44 percent of respondents report cost savings from AI adoption in the business units where it's deployed, with respondents from high performers more than four times likelier than others to say AI adoption has decreased business units' costs by at least 10 percent, on average. The two functions in which the largest shares of respondents report cost decreases in individual AI use cases are manufacturing and supply-chain management. In manufacturing, responses suggest some of the most significant savings come from optimizing yield, energy, and throughput. In supply-chain management, respondents are most likely to

Exhibit 1

Revenue increases from adopting AI are reported most often in marketing and sales, and cost decreases most often in manufacturing.

Cost decrease and revenue increase from AI adoption, by function,[1] % of respondents[2]



[1] Marketing and sales includes the following use cases: customer-service analytics, customer segmentation, channel management, prediction of likelihood to buy, pricing and promotion, closed-loop marketing, marketing-budget allocation, churn reduction, and next product to buy. For product and service development: product-feature optimization, product-development-cycle optimization, creation of new AI-based enhancements, and creation of new AI-based products. For supply-chain management: logistics-network optimization, sales and parts forecasting, warehouse optimization, inventory and parts optimization, spend analytics, and sales and demand forecasting. For manufacturing: predictive maintenance and yield, energy, and throughput optimization. For service operations: service-operations optimization, contact-center automation, and predictive service and intervention. For strategy and corporate finance: capital allocation, treasury management, and M&A support. For risk: risk modeling/analytics, and fraud/debt analytics. For HR: performance management and organization-design, workforce-deployment, and talent-management optimization.

[2] Question asked only of respondents who said their companies adopted AI in given use case. Figures were calculated after removing respondents who said "don't know" or "not applicable; we are not tracking revenue related to AI"; respondents who said "no change" are not shown.

report savings from spend analytics and logistics-network optimization.

AI adoption is increasing in nearly all industries, but capabilities vary

As in last year's survey, we asked respondents about their companies' use of nine AI capabilities.[5] Fifty-eight percent of respondents report that their organizations have embedded at least one AI capability into a process or product in at least one function or business unit, up from 47 percent in 2018—a sign that AI adoption in general is becoming more mainstream. What's more, responses show an increase in the share of companies using AI in products or processes across multiple business units and functions: 30 percent of this year's respondents report doing so, compared with 21 percent in the previous survey. While this seems to indicate that more companies are beginning to scale AI, high performers are much further along in these efforts, averaging 11 reported AI use cases across the organization versus about three among other companies.

By sector, the results indicate increases in AI adoption in nearly every industry in the past year. Retail has seen the largest increase, with 60 percent of respondents saying their companies have embedded at least one AI capability in one or more functions or business units, a 35-percentage-point increase from 2018.

The results show companies applying AI capabilities that help them perform the functions that create value in their industries. For example, respondents from consumer-packaged-goods companies are more likely to report using physical robotics—which can aid in assembly tasks—than most other types of capabilities. And telecom respondents report their companies using virtual agents—which can be used in customer-service applications—more than other capabilities (Exhibit 2). High-performing companies, however, are far more likely to adopt AI in business functions that this survey and past research link to greater value creation more broadly.[6] For example, more than 80 percent of respondents from high performers say they have adopted AI in marketing and sales, compared with only one-quarter from those of other companies that use AI.

On a regional level, the survey shows significant increases in adoption levels in developed Asia–Pacific,[7] Europe, Latin America, and North America. In Asia–Pacific and Latin America, the shares of respondents who say their companies have embedded AI across multiple functions or business units have nearly doubled since the previous survey. However, the increases put all of these regions, as well as China, at similar aggregate reported levels of adoption, suggesting that while there is considerable variation at the level of individual companies, the adoption of AI is a global phenomenon.[8]

The results indicate that the pace of adoption will likely continue in the near term, with 74 percent of respondents whose companies have adopted or plan to adopt AI saying their organizations will increase their AI investment in the next three years. More than half of these respondents expect an increase of 10 percent or more. But the survey results indicate that AI high performers plan to invest more, with nearly 30 percent of respondents from these companies saying their organizations will increase investment in AI by 50 percent or more in the next three years, compared with just 9 percent of others who say the same.

[5] "AI adoption advances, but foundational barriers remain," November 2018, McKinsey.com. Respondents were asked to describe their organizations' use of the following AI capabilities: natural language text understanding, natural language speech understanding, natural language generation, virtual agents or conversational interfaces, computer vision, robotic process automation, machine learning, physical robotics, and autonomous vehicles.

[6] Michael Chui, Rita Chung, Nicolaus Henke, Sankalp Malhotra, James Manyika, Mehdi Miremadi, and Pieter Nel, "Notes from the AI frontier: Applications and value of deep learning," McKinsey Global Institute, April 2018, McKinsey.com.

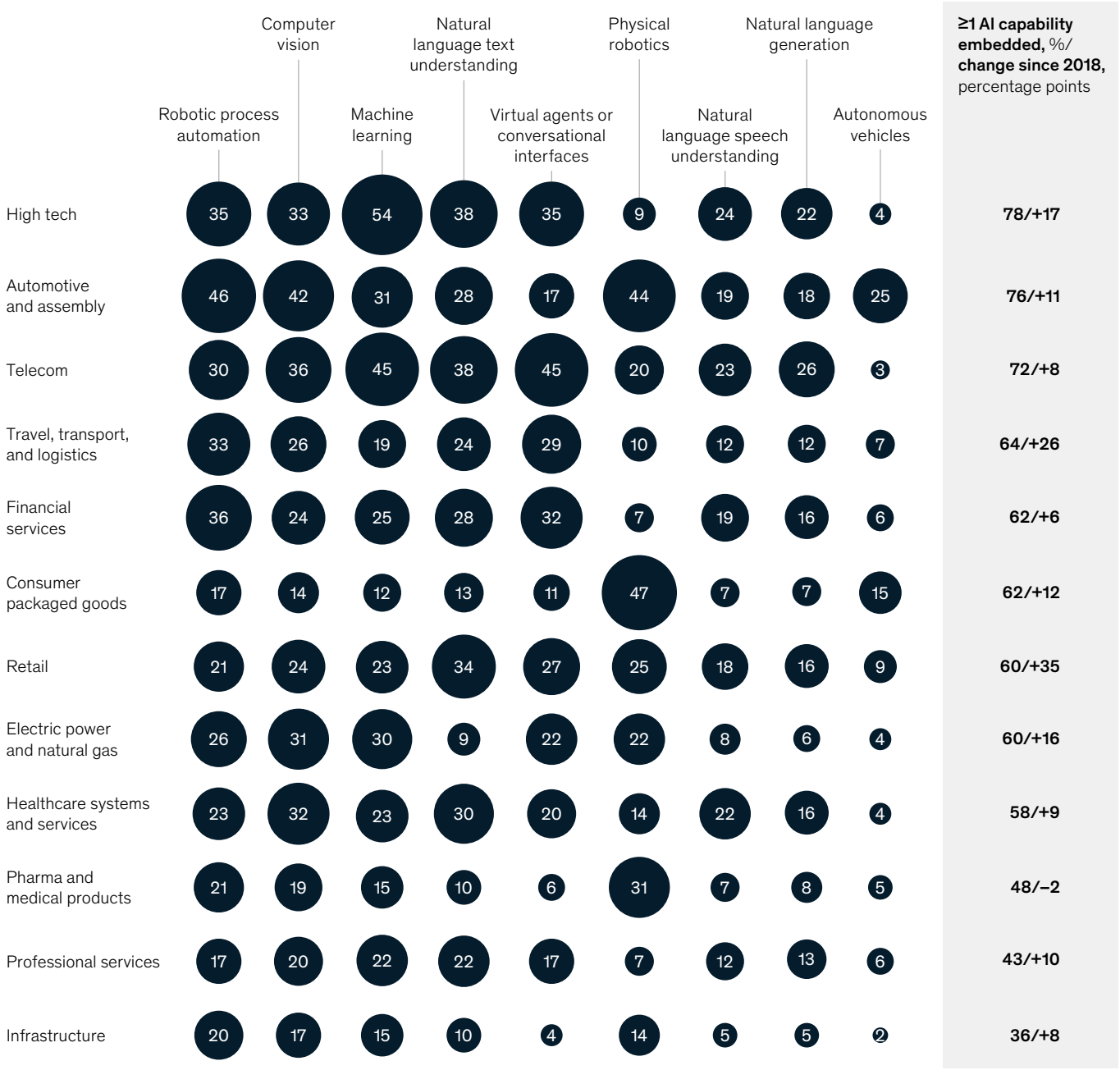
[7] Includes Australia, Hong Kong, Japan, New Zealand, the Philippines, Singapore, South Korea, and Taiwan.

[8] In each region, about three in ten respondents say their organizations have embedded AI across multiple functions or business units. In China, the base size is below the baseline for statistical significance. For more on what AI means for China, see Dominic Barton, Jeongmin Seong, Qinzheng Tian, and Jonathan Woetzel, "Artificial intelligence: Implications for China," McKinsey Global Institute, April 2017, McKinsey.com.

Exhibit 2

High tech leads in AI adoption, and industries are generally using the AI capabilities most relevant to their value chains.

Organizations' AI capabilities,[1] % of respondents,[2] by industry



≥1 AI capability embedded, %/ **change since 2018,** percentage points

High tech	**78/+17**
Automotive and assembly	**76/+11**
Telecom	**72/+8**
Travel, transport, and logistics	**64/+26**
Financial services	**62/+6**
Consumer packaged goods	**62/+12**
Retail	**60/+35**
Electric power and natural gas	**60/+16**
Healthcare systems and services	**58/+9**
Pharma and medical products	**48/–2**
Professional services	**43/+10**
Infrastructure	**36/+8**

[1] Embedded in ≥1 product and/or business process for ≥1 function or business unit.
[2] Respondents who said "don't know" or "none of the above" are not shown. For high tech, n = 277; for automotive and assembly, n = 128; for telecom, n = 93; for travel, transport, and logistics, n = 83; for financial services, n = 396; for consumer packaged goods, n = 72; for retail, n = 94; for electric power and natural gas, n = 82; for healthcare systems and services, n = 78; for pharma and medical products, n = 96; for professional services, n = 331; and for infrastructure, n = 91.

AI high performers tend to engage in value-capturing practices

According to our experience and past research on analytics, some core practices are necessary to capture value at scale.[9] These include, among others, aligning business, analytics, and IT leaders on the potential value at stake from AI across each business domain; investing in talent, such as translator expertise; and ensuring that business staff and technical teams have the skills necessary for successful scaling.[10]

The survey results suggest these core practices hold true for scaling AI, given that respondents at AI high performers are far more likely than others to say their organizations apply these practices (Exhibit 3). For example, 72 percent of respondents from AI high performers say their companies' AI strategy aligns with their corporate strategy, compared with 29 percent of respondents from other companies. Similarly, 65 percent from the high performers report having a clear data strategy that supports and enables AI, compared with 20 percent from other companies.

Even the AI high performers have work to do in several key areas. For example, only 36 percent of respondents from these companies say their frontline employees use AI insights in real time for daily decision making, and just 42 percent systematically track a comprehensive set of well-defined key performance indicators for AI—two practices, in our experience, that are crucial for achieving end-user adoption and value. Likewise, only 35 percent of respondents from AI high performers report having an active continuous-learning program on AI for employees.

A minority of companies acknowledge most AI risks—fewer mitigate them

Despite extensive dialogue across industries about the potential risks of AI and highly publicized incidents of privacy violations, unintended bias, and other negative outcomes,[11] the survey findings suggest that a minority of companies recognize many of the risks of AI use. Even fewer are taking action to protect against the risks.

Fewer than half of respondents (41 percent) say their organizations comprehensively identify and prioritize their AI risks. The survey also asked specifically about ten of the most widely recognized risks. Of them, respondents most often cite cybersecurity and regulatory compliance as the AI-related risks their companies consider

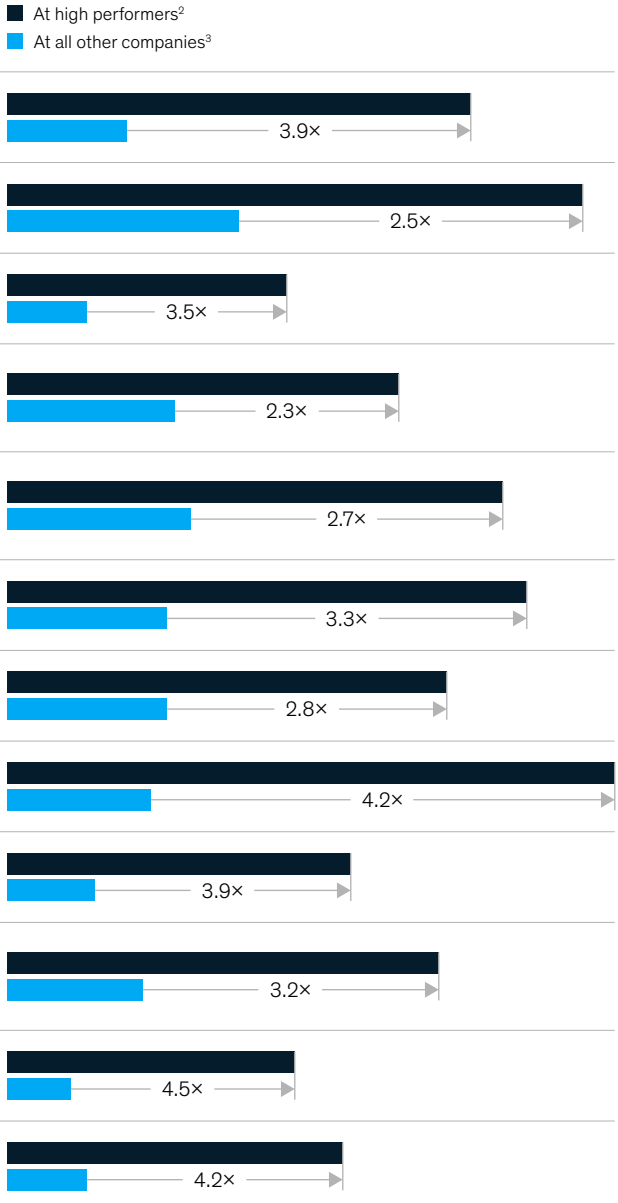
Fewer than half of respondents (41 percent) say their organizations comprehensively identify and prioritize their AI risks.

[9] Peter Bisson, Bryce Hall, Brian McCarthy, and Khaled Rifai, "Breaking away: The secrets to scaling analytics," May 2018, McKinsey.com.
[10] Brian McCarthy, Chris McShea, and Marcus Roth, "Rebooting analytics leadership: Time to move beyond the math," November 2018, McKinsey.com; Nicolaus Henke, Jordan Levine, and Paul McInerney, "Analytics translator: The new must-have role," February 2018, McKinsey.com; Solly Brown, Darshit Gandhi, Louise Herring, and Ankur Puri, "The analytics academy: Bridging the gap between human and artificial intelligence," *McKinsey Quarterly*, September 2019, McKinsey.com.
[11] Benjamin Cheatham, Kia Javanmardian, and Hamid Samandari, "Confronting the risks of artificial intelligence," *McKinsey Quarterly*, April 2019, McKinsey.com.

Exhibit 3

Respondents at AI high performers are much more likely than others to report that their organizations apply core practices for scaling AI.

Share of respondents saying given statement is true of their organizations, %[1]



[1] Question asked only of respondents who said their companies had embedded or piloted ≥1 AI capability.
[2] Respondents who said companies have adopted AI in ≥5 business activities (ie, top quartile for the number of activities using AI), seen an average revenue increase of ≥5% from AI adoption in the business units where AI is used, and seen an average cost decrease of ≥5% from AI adoption in the business units where AI is used, n = 54.
[3] n = 1,818.

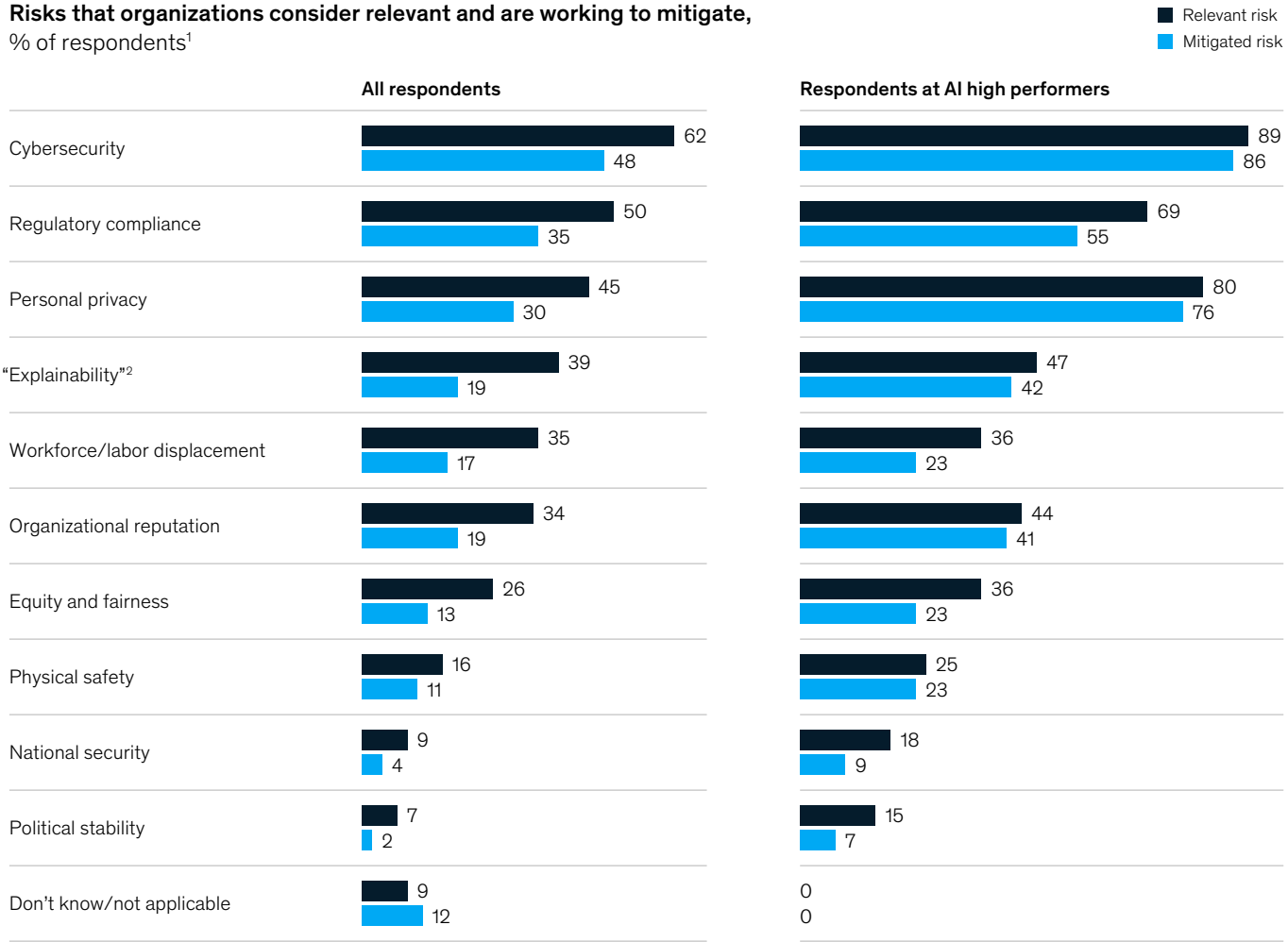
relevant (Exhibit 4). These two risks are the only ones that at least half of respondents cite as relevant. Furthermore, the share of respondents saying their companies are mitigating each risk is smaller than the share citing it as relevant. For example, while 39 percent of respondents say their companies recognize risk associated with "explainability" (the ability to explain how AI models come to their decisions), only 21 percent say they are actively addressing this risk. At the companies that reportedly do mitigate AI risks, the most frequently reported tactic is conducting internal reviews of AI models.

Respondents at AI high performers are likelier than those from other companies to say their organizations both recognize and work to reduce risks. Take personal-privacy risk, which is squarely in regulators' line of sight. Eighty percent of respondents at high-performing companies say their companies consider personal-privacy risk to be relevant, compared with less than half of respondents from other companies. When asked about internal controls aimed at reducing privacy risks, 89 percent of respondents at high-performing companies say their organizations adopt and enforce enterprise-wide privacy policies, compared with 68 percent

Exhibit 4

Respondents at AI high performers are more likely than average to say their companies identify AI-related risks—and work to mitigate them.

Risks that organizations consider relevant and are working to mitigate, % of respondents[1]



[1] Question asked only of respondents who said their companies had embedded or piloted ≥1 AI capability; n = 1,872.
[2] Ability to explain how AI models come to their decisions.

of other respondents. Similarly, 80 percent of respondents at AI high performers report that their organizations implement tech-enabled access restrictions to sensitive data, versus 59 percent of those at other companies.

More expect AI to cause workforce decreases than increases, with variances across functions

Generally, there has been increasing concern that AI will lead to workforce reduction.[12] The survey findings suggest that, thus far, this concern has largely not been realized. More than one-third of respondents report less than a 3 percent change in their companies' workforce size because of AI deployment, and only 5 percent of respondents report a change, whether decrease or increase, of greater than 10 percent. While respondents from a handful of industries, including automotive and assembly, are more likely to report a workforce reduction than an increase in the past year because of AI (Exhibit 5), more respondents overall report job increases of 3 percent or more at their companies in the past year than report decreases of the same magnitude (17 percent and 13 percent, respectively).

But the outlook for the next three years could be shifting. Thirty-four percent of respondents from organizations that have adopted or plan to adopt AI expect it to drive a decrease in the number of employees, versus 21 percent who expect an increase—although most predict the change to be less than 10 percent in either direction.[13] Another 28 percent foresee AI adoption having little impact on workforce size, with any expected change being less than 3 percent.

Respondents also expect AI adoption to cause shifts in their workforce across functions. Respondents are more likely to predict a decrease than an increase in employment levels in HR, manufacturing, supply-chain management, and service operations. They more often predict an increase than a decrease in the number of employees in product development and marketing and sales.

Greater emphasis on workforce retraining is likely

The results indicate that a majority of respondents' companies are preparing for AI-related workforce changes. When asked about retraining workers in response to AI adoption, nearly six in ten respondents at companies using AI say at least some of their workforce has been retrained in the past year. In addition, 83 percent of respondents expect at least some of their workforce to be retrained in the next three years because of AI adoption, and 38 percent expect more than a quarter to be retrained.

Respondents are more likely to predict a decrease than an increase in employment levels in HR, manufacturing, supply-chain management, and service operations.

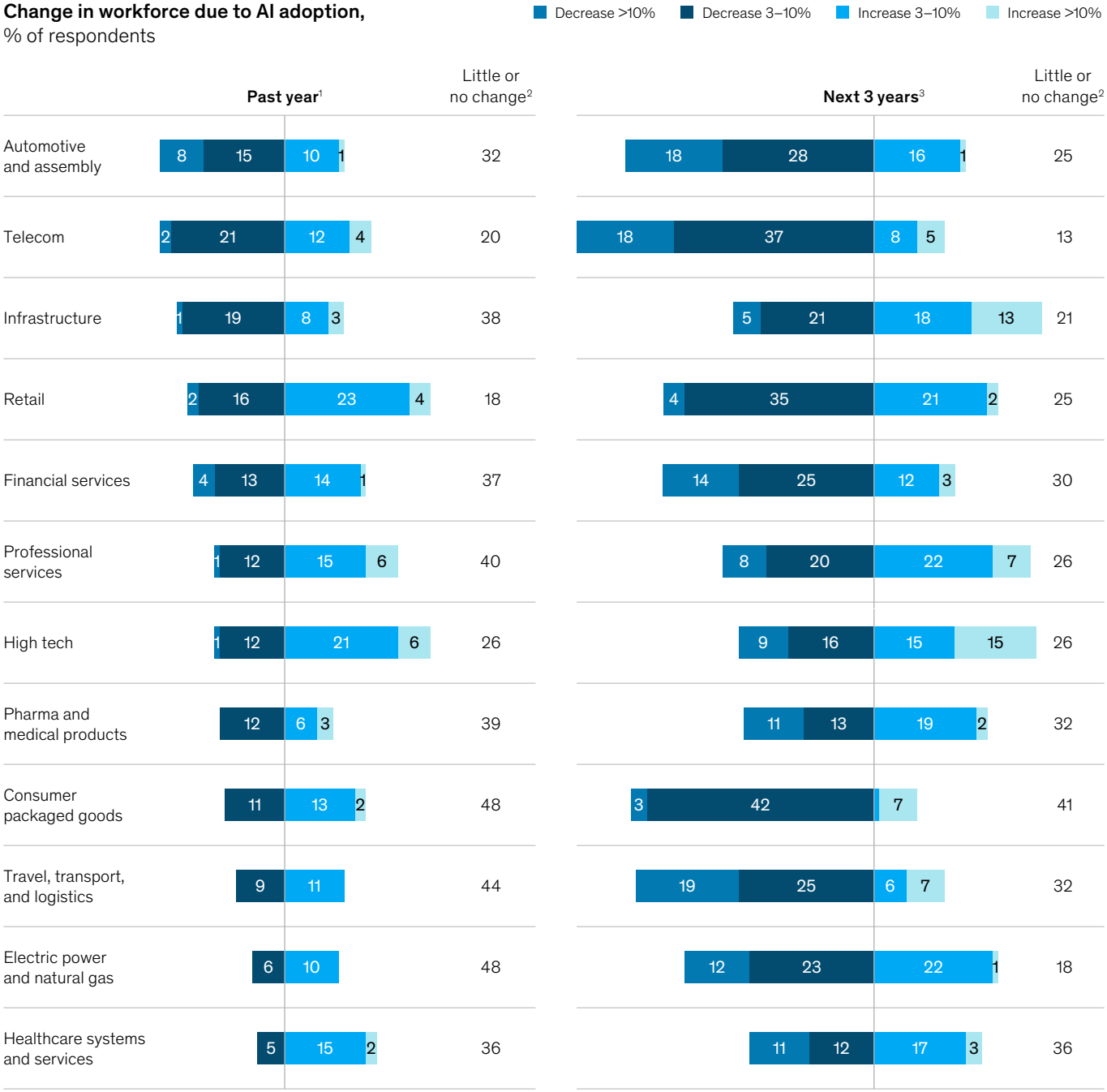
[12] For more information on how AI is expected to affect the workforce, see James Manyika and Kevin Sneader, "AI, automation, and the future of work: Ten things to solve for," McKinsey Global Institute, June 2018, McKinsey.com.

[13] Respondents reporting that their companies have piloted or embedded one or more AI capabilities, or plan to do so in the next three years, were asked how they expect the adoption of AI to affect the number of employees relative to the number if the organizations had not adopted AI.

Exhibit 5

Respondents in automotive and telecom report the deepest AI-related workforce cuts to date and predict the most going forward.

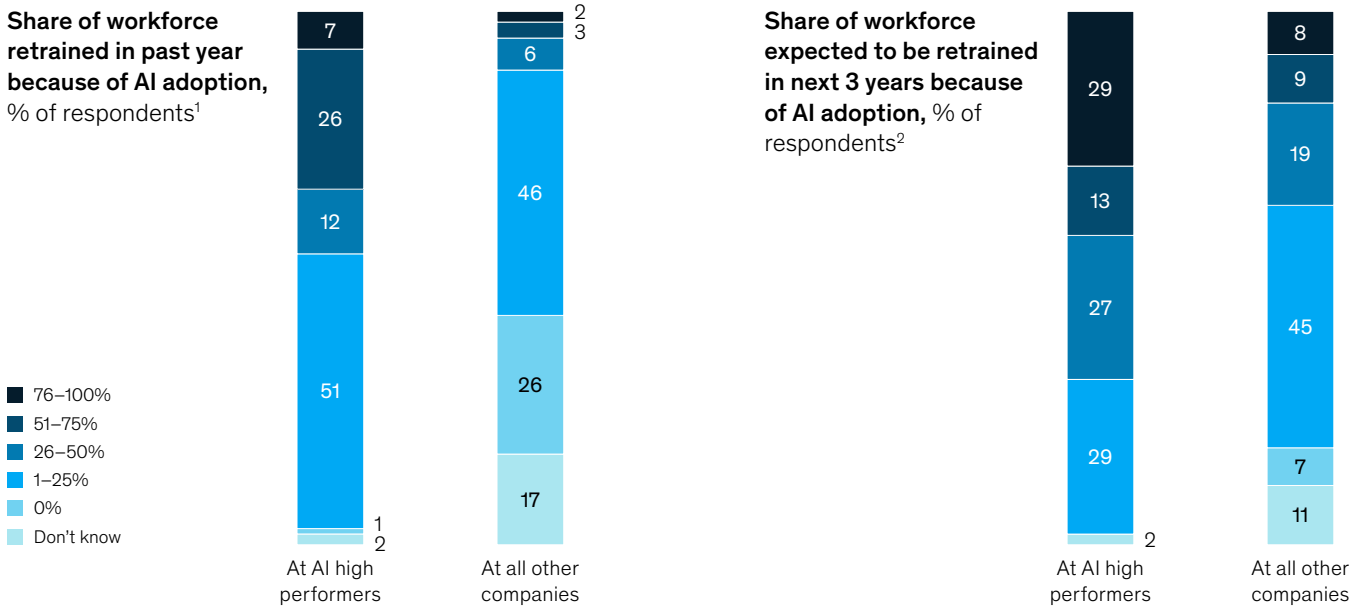
Change in workforce due to AI adoption,
% of respondents



[1] Change in workforce in past year because of AI adoption. Question only asked of respondents who say their companies have piloted or embedded ≥1 AI capability. Respondents who said "don't know" are not shown. For automotive and assembly, n = 111; for telecom, n = 81; for infrastructure, n = 63; for retail, n = 74; for financial services, n = 333; for professional services, n = 235; for high tech, n = 246; for pharma and medical products, n = 71; for consumer packaged goods, n = 55; for travel, transport, and logistics, n = 69; for healthcare systems and services, n = 60.
[2] A decrease or increase of ≤2%.
[3] Expected change in workforce in next 3 years because of AI adoption, relative to size if AI had not been adopted. Question was asked only of respondents who say their companies have piloted or embedded ≥1 AI capability, or plan to do so in the next 3 years. Respondents who said "don't know" are not shown. For automotive and assembly, n = 113; for telecom, n = 85; for infrastructure, n = 65; for retail, n = 76; for financial services, n = 341; for professional services, n = 245; for high tech, n = 253; for pharma and medical products, n = 78; for consumer packaged goods, n = 58; for travel, transport, and logistics, n = 70; and for healthcare systems and services, n = 67.

Exhibit 6

Respondents at high performers report larger retraining efforts as a result of AI than others do.



Note: Figures may not sum to 100%, because of rounding.
[1] Question was asked only of respondents who say their companies have piloted or embedded one or more AI capabilities. For respondents at high performers, n = 54; for all others, n = 1,818.
[2] Question was asked only of respondents who say their companies have piloted or embedded one or more AI capabilities, or plan to do so in the next three years. For respondents at high performers, n = 54; for all others, n = 1,892.

Respondents at AI high performers report retraining much greater shares of employees in the past year because of AI, compared with respondents at other companies that have adopted AI (Exhibit 6). Respondents at high performers also predict that their companies will retrain larger shares of their workforce in the next three years.

With the research showing that companies now use AI more often than not, the technology appears to have reached another stepping stone in its ascent in business. Along with it comes a ratcheting up of the urgency to scale AI among those still early in their adoption journeys. However, while the survey results indicate that some companies are further ahead in realizing AI's impact, they also suggest a path for lagging companies to catch up.

The survey content and analysis were developed by **Arif Cam**, a consultant in McKinsey's Silicon Valley office; **Michael Chui**, a partner of the McKinsey Global Institute and a partner in the San Francisco office; and **Bryce Hall**, an associate partner in the Washington, DC, office.

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