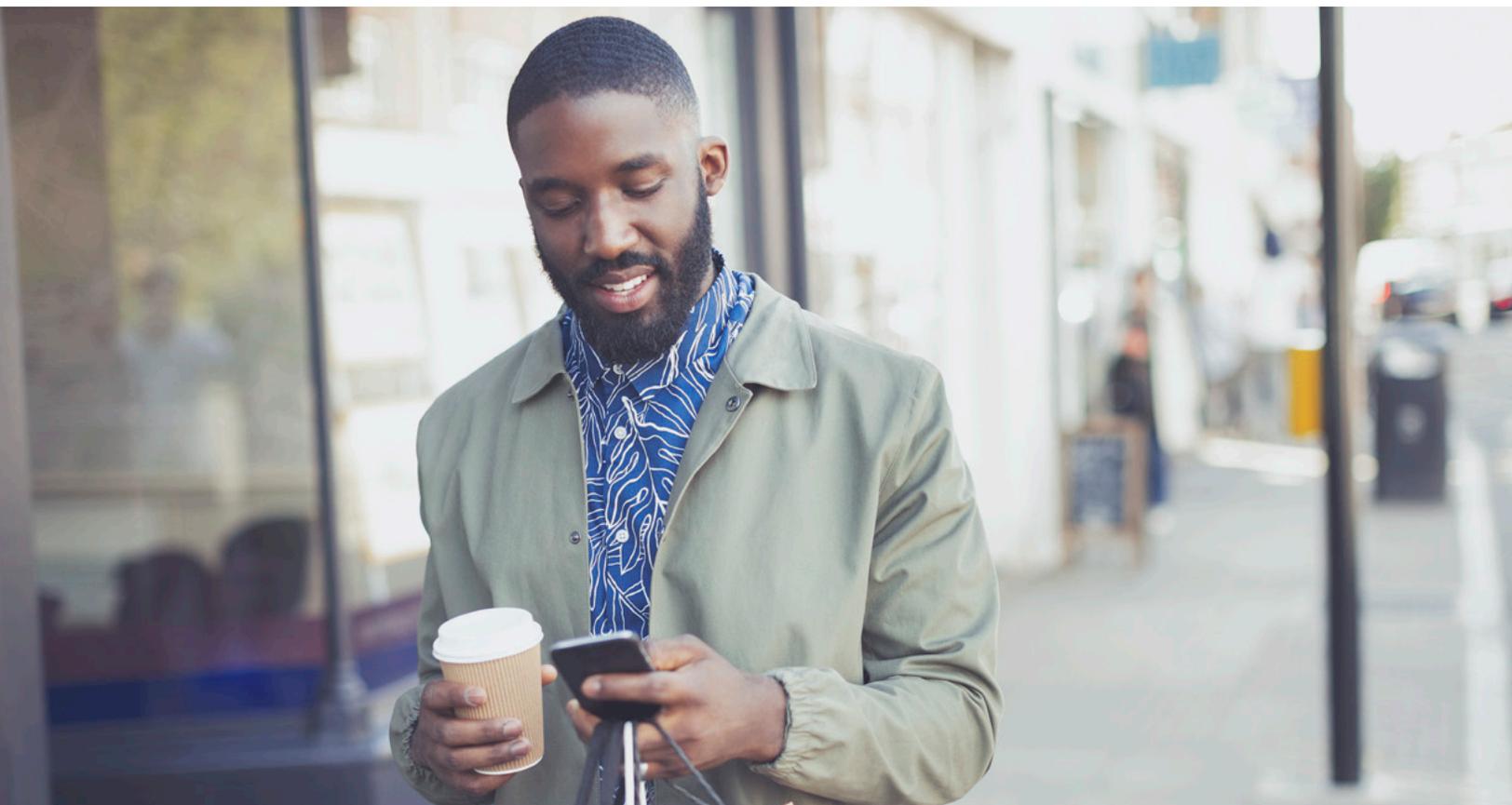


Most of AI's business uses will be in two areas

An examination of more than 400 AI use cases revealed the two areas where AI can have the greatest impact.

by Michael Chui, Nicolaus Henke, and Mehdi Miremadi



While overall adoption of artificial intelligence (AI) remains low among businesses (about 20 percent upon our last study), senior executives know that AI isn't just hype. Organizations across sectors are looking closely at the technology to see what it can do for their business. As they should—we estimate that 40 percent of all the potential value that can be created by analytics today comes from the AI techniques that fall under the umbrella “deep learning” (which utilize multiple layers of artificial neural networks, so-called because their structure and function are loosely inspired by that of the human brain). In total, we estimate deep learning could account for between \$3.5 trillion and \$5.8 trillion in annual value.

However, many business leaders are still not exactly sure *where* they should apply AI to reap the biggest rewards. After all, embedding AI across the business requires significant investment in talent and upgrades to the tech stack as well as sweeping change initiatives to ensure AI drives meaningful value, whether it be through powering better decision making or enhancing consumer-facing applications.

Through an in-depth examination of more than 400 actual AI use cases across 19 industries and nine business functions, we've discovered an old adage proves most useful in answering the question of where to put AI to work: “Follow the money.”

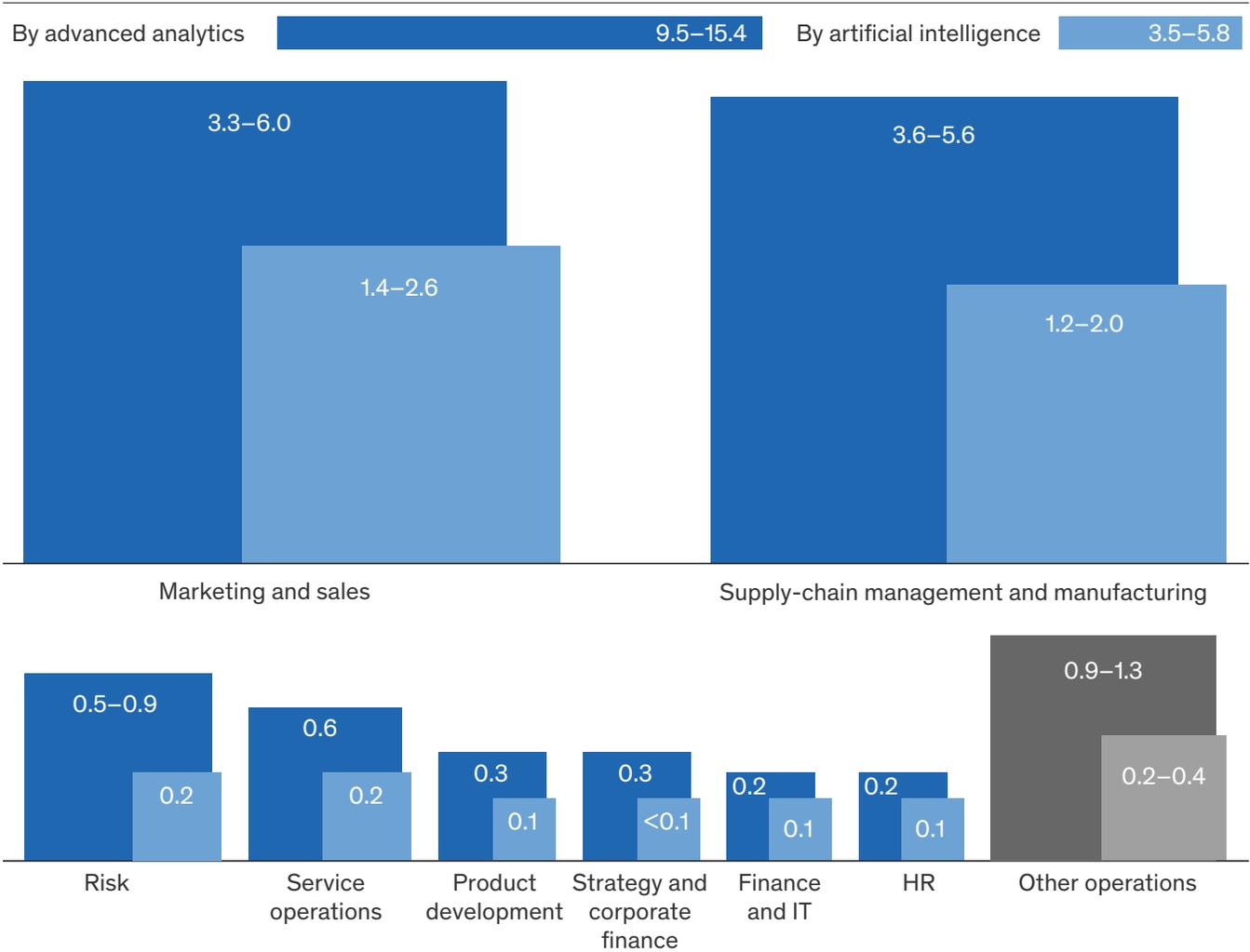
The business areas that traditionally provide the most value to companies tend to be the areas where AI can have the biggest impact. In retail organizations, for example, marketing and sales has often provided significant value. Our research shows that using AI on customer data to personalize promotions can lead to a 1 to 2 percent increase in incremental sales for brick-and-mortar retailers alone. In advanced manufacturing, by contrast, operations often drive the most value. Here, AI can enable forecasting based on underlying causal drivers of demand rather than prior outcomes, improving forecasting accuracy by 10 to 20 percent. This translates into a potential 5 percent reduction in inventory costs and revenue increases of 2 to 3 percent.

While applications of AI cover a full range of functional areas, it is in fact in these two cross-cutting ones—supply-chain management/manufacturing and marketing and sales—where we believe AI can have the biggest impact, at least for now, in several industries (exhibit). Combined, we estimate that these use cases make up more than two-thirds of the entire AI opportunity. AI can create \$1.4 trillion to \$2.6 trillion of value in marketing and sales across the world's businesses, and \$1.2 trillion to \$2 trillion in supply-chain management and manufacturing (some of the value accrues to companies, while some is captured by customers). In manufacturing, the greatest value

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Exhibit

Artificial intelligence’s impact is likely to be most substantial in marketing and sales as well as supply-chain management and manufacturing, based on our use cases.



Note: Figures may not sum to 100%, because of rounding.

Source: McKinsey Global Institute analysis

from AI can be created by using it for predictive maintenance (about \$0.5 trillion to \$0.7 trillion across the world's businesses). AI's ability to process massive amounts of data, including audio and video, means it can quickly identify anomalies to prevent breakdowns, whether that be an odd sound in an aircraft engine or a malfunction on an assembly line detected by a sensor.

Another way business leaders can home in on where to apply AI is to simply look at the functions that are already taking advantage of traditional analytics techniques. We found that the greatest potential for AI to create value is in use cases where neural network techniques could either provide higher performance than established analytical techniques or generate additional insights and applications. This is true for 69 percent of the AI use cases identified in our study. In only 16 percent of use cases did we find a "greenfield" AI solution that was applicable where other analytics methods would not be effective. (While the number of use cases for deep learning will likely increase rapidly as algorithms become more versatile and the type and volume of data needed to make them viable become more available, the percentage of greenfield deep learning use cases might not increase significantly, because more established machine learning techniques also have room to become better and more ubiquitous.)

We don't want to come across as naïve cheerleaders. Even as we see economic potential in the use of AI techniques, we recognize the tangible obstacles and limitations to implementing AI. Obtaining data sets that are sufficiently large and comprehensive

enough to feed the voracious appetite that deep learning has for training data is a major challenge. So, too, is addressing the mounting concerns around the use of such data, including security, privacy, and the potential for passing human biases onto AI algorithms. In some sectors, such as healthcare and insurance, companies must also find ways to make the results explainable to regulators in human terms: why did the machine come up with this answer? The good news is that the technologies themselves are advancing and starting to address some of these limitations.

Beyond these limitations, there are the arguably more difficult organizational challenges companies face as they adopt AI. Mastering the technology requires new levels of expertise, and process can become a major impediment to successful adoption. Companies will have to develop robust data maintenance and governance processes and focus on both the "first mile"—how to acquire data and organize data efforts—and the far more difficult "last mile," how to integrate the output of AI models into workflows, ranging from those of clinical-trial managers and sales-force managers to procurement officers.

While businesses must remain vigilant and responsible as they deploy AI, the scale and beneficial impact of the technology on businesses, consumers, and society make pursuing AI opportunities worth a thorough investigation. The pursuit isn't a simple prospect, but it can be initiated by evoking a simple concept: follow the money.

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Michael Chui is a partner of the McKinsey Global Institute and is based in McKinsey's San Francisco office, **Nicolaus Henke** is a senior partner in the London office, and **Mehdi Miremadi** is a partner in the Chicago office.

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