ARTIFICIAL INTELLIGENCE: WHY A DIGITAL BASE IS CRITICAL

Early AI adopters are starting to shift industry profit pools. Companies need strong digital capabilities to compete.

by Jacques Bughin and Nicolas van Zeebroeck

The diffusion of a new technology, whether ATMs in banking or radio-frequency identification tags in retailing, typically traces an S-curve. Early on, a few power users bet heavily on the innovation. Then, over time, as more companies rush to embrace the technology and capture the potential gains, the market opportunities for nonadopters dwindle. The cycle draws to a close with slow movers suffering damage.[1]

Our research suggests that a technology race has started along the S-curve for artificial intelligence (AI), a set of new technologies now in the early stages of deployment.[2] It appears that AI adopters can't flourish without a solid base of core and advanced digital technologies. Companies that can assemble this bundle of capabilities are starting to pull away from the pack and will probably be AI's ultimate winners. Executives are becoming aware of what is at stake: our survey research shows that 45 percent of executives who have yet to invest in AI fear falling behind competitively. Our statistical analysis suggests that faced with AI-fueled competitive threats, companies are twice as likely to embrace AI as they were to adopt new technologies in past technology cycles.[3]
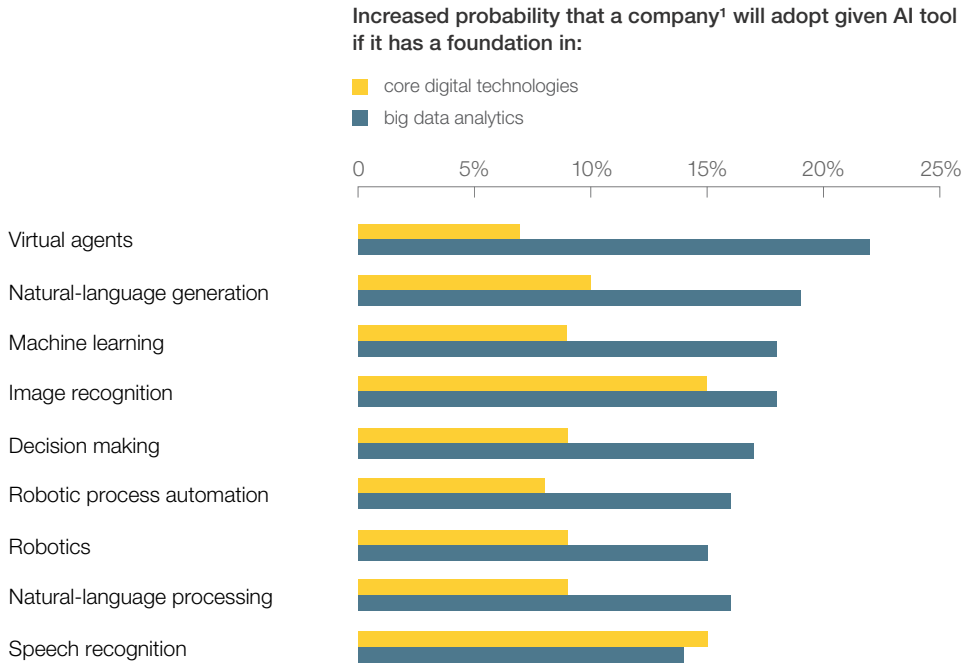
AI builds on other technologies

To date, though, only a fraction of companies—about 10 percent—have tried to diffuse AI across the enterprise, and less than half of those companies are power users, diffusing a majority of the ten fundamental AI technologies. An additional quarter of companies have tested AI to a limited extent, while a long tail of two-thirds of companies have yet to adopt any AI technologies at all.[4]

The adoption of AI, we found, is part of a continuum, the latest stage of investment beyond core and advanced digital technologies. To understand the relationship between a company's digital capabilities and its ability to deploy the new tools, we looked at the specific technologies at the heart of AI. Our model tested the extent to which underlying clusters of core digital technologies (cloud computing, mobile, and the web) and of more advanced technologies (big data and advanced analytics) affected the likelihood that a company would adopt AI. As Exhibit 1 shows, companies with a strong base in these core areas were statistically more likely to have adopted each of the AI tools—about 30 percent more likely when the two clusters of

Exhibit 1

Companies with a strong base in core digital technologies and big data analytics are more likely to have adopted an array of AI tools.

Increased probability that a company[1] will adopt given AI tool if it has a foundation in:

- ◼ core digital technologies
- ◼ big data analytics

| | 0 | 5% | 10% | 15% | 20% | 25% |

Virtual agents

Natural-language generation

Machine learning

Image recognition

Decision making

Robotic process automation

Robotics

Natural-language processing

Speech recognition

[1] Sample sizes vary by technologies, but each assessment of technology adoption is based on >1,300 survey responses.

Source: 2017 Digital McKinsey survey of 1,760 companies; 2017 Vivatech survey of 3,023 companies

technologies are combined.[5] These companies presumably were better able to integrate AI with existing digital technologies, and that gave them a head start. This result is in keeping with what we have learned from our survey work. Seventy-five percent of the companies that adopted AI depended on knowledge gained from applying and mastering existing digital capabilities to do so.

This digital substructure is still lacking in many companies, and that may be slowing the diffusion of AI. We estimate that only one in three companies had fully diffused the underlying digital technologies and that the biggest gaps

were in more recent tools, such as big data, analytics, and the cloud. This weak base, according to our estimates, has put AI out of reach for a fifth of the companies we studied.

Leaders and laggards

Beyond the capability gap, there's another explanation for the slower adoption of AI among some companies: they may believe that the case for it remains unproved or that it is a moving target and that advances in the offing will give them the chance to leapfrog to leadership positions without a need for early investments.

Our research strongly suggests that waiting carries risks. Early movers appear to be racking up performance gains, and AI investments by first movers are also setting the stage for a second wave of gains. After realizing initial business-model improvements through AI, it seems, companies use the profits to invest in additional AI applications, adding further to their margins.

To provide a more detailed picture of AI leaders and laggards, we examined four levels of internal diffusion of both AI and digital technologies across six industries.[6]

Our analysis suggests that power users of AI with a strong digital base can boost profits by one to five percentage points above industry averages (Exhibit 2). The analysis showed that profits among companies in the bottom two tiers—companies, in each industry, that had yet to diffuse AI and had a weak or no footing in digital technologies—were significantly below industry averages. In finance, where AI and digital technologies are creating greater competitive differentiation, the profit gap is wider than it is in construction, where (so far) AI and digital strategies have been relatively uncommon.

Exhibit 2

Power users that invest in both core and advanced digital technologies see a boost in profits.

Estimated profit margin relative to industry average,[1] percentage points

- Energy
- Finance
- Automotive
- Telecom
- Tech
- Construction

Companies with …

… high diffusion of both AI and digital technologies

… lower AI diffusion but relatively strong digital intensity

… no AI diffusion and limited digital intensity

… no diffusion of either AI or digital technologies

[1] Sample size for each industry reflects >60% of survey responses.

Source: 2017 Digital McKinsey survey of 1,760 companies; 2017 Vivatech survey of 3,023 companies

Reaching a tipping point?

Interestingly, the downward pressure on margins for the greater number (long tail) of companies in the lower two quadrants is greater than the uplift experienced by the smaller circle of companies that have either broadly adopted AI or are testing it (about 35 percent of our sample). This suggests that AI and digital competition are depressing overall industry margins. Our prior research on core and advanced digital technologies found that industries reach a tipping point once 15 percent of revenues shift to digital attackers and very fast followers.[7] While AI competition isn't in this zone yet, our model indicates that revenue shifts are moving toward it as the diffusion of AI accelerates over the next five years.

The number of companies applying the full range of AI technologies, of course, is still small, and many of the most advanced power users in our research, notably, were digital natives. But the competition is stiffening—fast followers are responding as they see profits drained by attackers. Companies that have a strong base in digital capabilities will benefit, since they can move more quickly to adopt AI. Companies with a less favorable digital foundation will need to line up new talent and rev up their digital-transformation efforts. ⓠ

[1] See, for example, Lucio Fuentelsaz, Jaime Gómez, and Sergio Palomas, "Intrafirm diffusion of new technologies. A competitive interaction approach," University of Zaragoza, Spain, 2008 (mimeographed); or Tugrul Daim and Pattharaporn Suntharasaj, "Technology diffusion: Forecasting with bibliometric analysis and Bass model," *Foresight*, 2009, Volume 11, Number 3, pp. 45–55.

[2] Our research is based on two samples. The first is a global survey, conducted in 2017, which includes 3,000 executives from companies across ten industries and ten countries. A second, an independent sample of 2,000 firms, is one of McKinsey's global surveys on key management issues. The data we used focused on the digitization of enterprises.

[3] We found a 50 percent probability in the case of AI competition as compared with a 25 percent probability for earlier digital technologies.

[4] For another look at AI diffusion, see *Harvard Business Review* blog, "A survey of 3,000 executives reveals how businesses succeed with AI," blog entry by Jacques Bughin, Brian McCarthy, and Michael Chui, August 28, 2017, hbr.org.

[5] Or three times more likely to be a first mover adopting the entire suite of AI tools than a company with a poor digital base.

[6] We looked at four levels of AI and digital diffusion: high diffusion of AI and digital, with adoption of more than five AI technologies and broad, underlying digital diffusion; low AI diffusion (fewer than five AI technologies) and relatively high digital-technology diffusion; no AI diffusion and low levels of digital diffusion; and no diffusion of both AI and digital technologies. We defined the underlying digital technologies as fixed and mobile web access, enterprise 2.0 communications technologies, cloud computing, the Internet of Things, and big data architecture.

[7] See Jacques Bughin, Laura LaBerge, and Nicolas van Zeebroeck, "When to shift your digital strategy into a higher gear," *McKinsey Quarterly*, August 2017, McKinsey.com.

Jacques Bughin is a director of the McKinsey Global Institute and a senior partner in McKinsey's Brussels office; **Nicolas van Zeebroeck** is a professor at the Solvay Brussels School of Economics and Management, Université libre de Bruxelles.