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What's Your Cognitive Strategy?

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Thomas H. Davenport and Vikram Mahidhar

In the eyes of many leaders, artificial intelligence and cognitive technologies are the most disruptive forces on the horizon. But most organizations don't have a strategy to address them.

Artificial intelligence (AI) and cognitive technologies are burgeoning, but few companies are yet getting value from their investments. The reason, in our view, is that many of the projects companies undertake aren't targeted at important business problems or opportunities. Some projects are simply too ambitious — the technology isn't ready, or the organizational change required is too great.

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In short, most organizations don't have a strategy for cognitive technologies.

Managers may question whether having a strategy for a specific technology is necessary, but in the case of cognitive technology the justification seems clear. A 2018 survey of senior executives in 60 large companies by Boston, Massachusetts-based NewVantage Partners, where one of us (Tom Davenport) is a fellow, found that 72% of respondents saw cognitive technologies as the force most likely to disrupt their

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companies over the next decade (up from 44% in 2017), and 93% said their companies were already investing in cognitive technologies.¹

Similarly, a 2017 survey of 300 C-suite and other senior executives by Genpact, a global professional services firm (where Vikram Mahidhar works), found that 96% of AI leaders — companies that achieve significant business outcomes from AI — believe AI will transform their workforce, but only 38% said their companies currently provide employees with re-skilling options.²



The size of both the opportunity and the disruptive threat of cognitive technologies makes cognitive strategy different from other technology strategies — say, e-commerce. Cognitive technology stands to be transformational. Driving the kind of widespread organizational change it will require won't be easy, especially when it comes to implications for the workforce. Companies need to give careful consideration to how boldly they will step forward into the cognitive world and how much risk they are willing to take on. Developing a coherent cognitive strategy — and a means to fund it — can give companies a distinct competitive advantage. The first critical step in this process is to define the purpose, goals, and key components of such a strategy. We aim to help you lay this groundwork in this article.

How to Approach Cognitive Strategy

Broadly speaking, cognitive technologies employ capabilities — including knowledge, perception, judgment, and the wherewithal to accomplish specific tasks — that were once the exclusive domain of humans. The question for managers is where and how to apply them. Should you use them to create new products or offerings? To boost product performance? To optimize internal business operations? To improve customer processes? To reduce head count? To free up workers to be more creative?

How companies go about applying cognitive technologies needs to be driven by the specifics of the company's strategy. The goal isn't to develop a new business strategy but to devise well-informed actions that align with existing business goals. For many companies, the cognitive strategy will result in a series of pilots, proofs of concept, and deployments of cognitive tools in various parts of the business. It will also provide a mechanism for re-skilling managers and employees to lead and run a cognitive-driven business.

One obvious area of interest is how to use cognitive technology to create new offerings that support top-line growth. A leader in this pursuit is General Electric Co., which has developed powerful tools that can digitally represent large machines such as jet engines, gas turbines, and windmills for the purpose of monitoring their performance. As sensors collect data representing conditions such as heat, vibration, and noise, the tools — referred to as “digital twins” — can diagnose faults, identify performance trends, and

predict maintenance needs, thereby reducing unplanned downtime. In addition to using the capability to optimize performance of specific pieces of equipment, companies can use such a capability more broadly to manage entire plants or fleets of aircraft or equipment, and to spot new revenue sources.

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In addition to new products and services, increased customer personalization that arises out of cognitive technology can yield revenue increases. Verizon Wireless Inc., for example, having recently suffered revenue declines, decided to invest in personalized marketing. Using intelligent agents that integrated hundreds of variables, including usage of current offerings and calls for service, it was able to develop combinations of products and target promotions to customers in specific zip codes that reversed the declines. For customers with specific phones and usage patterns, it created a “next best offer” program and an automatic upgrade aimed at customers who craved the newest phone.³

Process optimization, too, is a fertile area for cognitive solutions, thanks to the availability of data and the inefficiency inherent in many labor-intensive processes. A large U.S. consumer product manufacturer, for example, recently automated the audit process for paying retailers for trade promotions. It trained a machine to read and match unstructured text in contracts, invoices, and point-of-sales data, reducing its audit processing cost by about 60%. With the improved ability to identify erroneous charges (for example, bills from retailers for promotion allowances for goods that were not actually ordered), it was able to increase profits by \$20 million annually.

Although some companies have pursued fairly narrow cognitive strategies, others have been more ambitious. Efforts made by Procter & Gamble Co., for example, have highlighted three key components.⁴ The first one is to use machine learning to ensure that spending in areas such as trade promotion and digital advertising is efficiently allocated and targeted. The second is to use data (including new external data sets) to develop precision marketing models and programs for consumers. The third is to develop platforms and applications that help consumers use P&G products more effectively in their homes and lives. A good example is the Olay Skin Advisor, an image-processing system that can evaluate the condition of a woman’s facial skin from a photo. The findings can help her choose the most suitable Olay products.

Key Levers of Cognitive Strategy

Companies we have worked with are developing cognitive technology strategies that address a variety of issues, including content, technology components, people, change management, and ambitions.

Leveraging Content

Companies that own proprietary content, be it data or knowledge, should look for ways to incorporate that content in their products and processes, as well as in a cognitive system. This requires finding or creating a “knowledge graph” the company wants to license or own. This is particularly critical for natural language processing applications, such as intelligent agents or chatbots. A knowledge graph describes the relationships between key entities and terms used in the business and in its relationships. Google Inc. pioneered the idea of the knowledge graph when it began collecting billions of facts about internet searches and representing how they relate to each other on a graph.⁵ Other companies, such as IBM Corp. in its Watson division, have obtained their knowledge graphs from outside partners or through acquisitions (as IBM did through its purchase of The Weather Co. LLC for weather data). Although Watson is known for ingesting medical journals, perhaps it’s more noteworthy for its ability to convert content into “question/answer pairs” that can be used in interactions with clinicians.⁶

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Companies should think carefully before turning over content ownership and usage rights regarding core customers and products, or proprietary process information, to other organizations — even if the would-be users are able to add significant value to what they receive. Unless the information relates to tactical processes like facilities management or maintenance, companies should treat their information as a valuable corporate asset and seek ways to add value themselves. A pharmaceuticals company, for example, will probably want to own the content and models related to drug development, though it may be less intent on owning the knowledge graph for clinical trial processes, which are often outsourced anyway.



Technology Components

Cognitive technology isn’t one technology but a collection of them. It includes statistical machine learning, neural networks, and natural language processing and generation. Beyond selecting specific technologies, companies need to decide whether to build or buy the capabilities, whether to use proprietary or open-source software, whether to use one vendor’s tools or employ “best of breed,” and whether to use stand-alone applications or a broad platform.

There are no right answers — only decisions to make about what aligns best with an organization’s capabilities, business strategy, and overall cognitive strategy.⁷ Organizations with voluminous and rapidly changing structured data about customers may find that machine learning provides insight into customer preferences. However, if the need is to identify and sort unstructured information (such as sounds and images), deep-learning neural networks will work better.

Clearly, some companies are more knowledgeable about the powers of cognitive technology than others. Procter & Gamble and American Express Co., for example, have been involved with artificial intelligence since the 1980s. They have the ability to build their own cognitive applications and cobble together solutions using open-source tools. For companies with less experience and less-seasoned developers and data scientists, undertaking such challenges would be unthinkable.⁸ Those without internal expertise can work with expert analysts, IT professionals, and data scientists. And as the field develops, companies with little cognitive technology experience will have other options as well. Increasingly, mainstream applications such as Einstein, from Salesforce.com Inc., are embedding cognitive capabilities that do things like allow users to identify the best sales leads. It ranks leads according to their probability of closing based on factors drawn from past sales data (such as whether or not the lead received a product demo). SAP and Oracle, for their part, are embedding cognitive technologies into their enterprise resource planning systems. Implementing these functions requires little technical sophistication.

Companies lacking experience but with a desire to build numerous cognitive applications may want to use a cognitive platform that includes a variety of tools. IBM's Watson, which uses a range of application programming interfaces that enable companies to build software applications, is perhaps the best known. In addition, large technology vendors such as Amazon, Google, and Microsoft offer a variety of machine learning algorithms on their platforms, most of which are open source. Proprietary vendors increasingly offer platforms with multiple programs that can be assembled to solve particular problems.

While the capabilities of cognitive technologies are evolving quickly, every platform needs integration. In choosing a platform, the most important criterion should be whether it helps you address the types of problems you want to solve in the near term. You should also ensure that the technology you choose can both help you solve cognitive problems and assist you in deploying them into production systems and processes.

People

A key question for any organization seeking to pursue cognitive initiatives is how to find people who can do the work. Organizations have struggled in recent years with similar concerns about finding quantitative analysts and data scientists. The good news: An increasing number of universities' graduates are broadly educated in analytics and data science. The bad news: Not many of these graduates have been trained in cognitive technologies or specific methods. Similarly, there is a shortage of faculty who are sufficiently familiar with cognitive technologies to teach about them — and many of those who are deeply knowledgeable have been recruited out of the classroom to work for tech companies.

Nevertheless, companies need access to people with deep domain knowledge and awareness of cognitive technologies: Without such expertise, the organization's cognitive strategies will be based on neither. Those involved in strategic planning for cognitive technologies should be familiar with the major types of cognitive technology, how they can be applied, and how they might integrate with other information technologies.

They should be able to communicate with managers in nontechnical terms, and they should be familiar with the key issues of the business and its current strategic direction. They should also have an understanding of the particular business domains to which cognitive technology will be applied.

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In determining the appropriate people strategies, the choices are much the same as they are for the technologies themselves: Should you buy, build, or rent? To “buy” people, you will probably need to be located in a city with a large pool of technology talent and be prepared to offer attractive pay, stock options, and benefits. It will help if your company is taking on some interesting challenges.

To “build” people, you will need to train them in the necessary skills. Cisco Systems Inc., the networking hardware company based in San Jose, California, has been a leader for years in training and retraining employees in data science and cognitive skills. Through its distance-learning program for aspiring data scientists, it has trained several hundred data scientists who work for the company.⁹

The third option, “renting” people who work for consulting firms and who are already trained in the use of cognitive applications, is widely practiced by companies that lack the in-house expertise to build applications. This approach can work if the vendor or consulting firm has sufficiently well-trained people (this cannot be taken for granted). Companies interested in building longer-term capabilities in the cognitive space may find it useful to use a combination of employees and outside people.

No matter which people strategy you choose, it may be helpful to begin with a management education program for the executives who will ultimately make strategy decisions. Indeed, perhaps the most important aspect of a people strategy is helping senior executives and business unit leaders rethink how the businesses will work with cognitive technology. Although companies should be concerned with how they will develop cognitive applications, they also need individuals with business analysis skills and the ability to frame business problems to identify what technologies are appropriate to address them. Design-thinking skills play an important role as well — both for user interfaces and for the business processes in which the cognitive technologies will be applied.

At a large U.S. bank’s business- and investment-banking unit, for example, the senior management team wanted the business unit to explore new financial technologies including a series of cognitive technologies, machine learning among them. The executives evaluated several vendors to determine the best way to familiarize the bank and its managers with the technology. The vendor they chose developed a training program for about 40 managers, several of whom went on to become active supporters of new applications in their specific business areas. The applications included one that identifies business customers who are most likely to prepay loans and another that extracts relevant information from public data about privately held businesses.

Change Management

Projects employing cognitive technologies are not just about technological change. Those that go beyond the pilot or proof of concept stage are also intended to help transform organizational culture, behavior, and attitudes. These are not small challenges, especially given the apparent threat to people’s jobs. Since

cognitive technologies often involve the management or application of knowledge, these projects can be extremely threatening to knowledge workers. It is critical to address their concerns head on, as the threat appears largely overblown.

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In fact, in most of the nearly 200 cognitive projects we have studied, we have seen minimal layoffs. Take medical imaging. For years, there have been imaging systems based on cognitive technology that can detect potential cancers. Several studies have found that such systems can provide more accurate and reliable diagnoses than human radiologists.¹⁰ However, the new systems have not yet replaced radiologists, nor are they likely to do so any time soon. The technology isn't fully proven, and the integration with daily clinical processes will take many years.

Describing how cognitive technologies can provide improvements over the status quo, such as substantially increasing capacity or accomplishing tasks that weren't possible before, will help organizations generate employee support in the transformation process.

Ambitions

Finally, there's the question of how ambitious you should be. Some organizations pursue highly ambitious initiatives that have the potential to be game-changers. Others choose more modest goals — adding an intelligent agent as an experimental new channel to customers or automating a set of tasks.

There is no right answer to the question of ambition. That said, there are few examples of organizations that have yet succeeded in bringing about radical transformations with cognitive technologies, while there are many examples of organizations successfully going after “low-hanging fruit.”

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In recent years, MD Anderson Cancer Center, in Houston, Texas, has pursued both approaches in different parts of the organization, with varying results. In 2012, the organization began an innovation project it actually referred to as a “moonshot,” in which it used IBM's Watson to diagnose and treat certain forms of cancer. In 2017, after investing more than \$60 million, the hospital put the project on hold.¹¹ It was not able to treat patients successfully yet, and it had not been integrated at all with the hospital's electronic medical record system.

During the same time frame, a group within the IT function at MD Anderson employed cognitive technologies on more mundane tasks. These included making hotel and restaurant recommendations for patients' families, determining which patients needed help paying bills, and launching an automated “cognitive help desk” for addressing staff IT problems. Another group used machine learning to analyze cancer treatments for patients with particular genomes. These projects have been successful, and more are underway.

MD Anderson's experience with cognitive projects offers lessons to anyone weighing cognitive initiatives. Although there are circumstances in which highly ambitious projects may be appropriate, in our view they are best suited to settings where the technology has been tested, the organization has already had success with large-scale IT-driven transformation, and senior managers are fully on board. For most companies, the best approach is to develop a series of more modest applications in the same general area of the business (say, improving customer relationships) that together have the potential to have a substantial effect on the business. That way, each element will be relatively low risk, and the company will have time to ease into a transformation.

Cognitive technology is not a fad. In the eyes of many managers, it is the most disruptive technology on the horizon. Investors seem to agree. Leaders need to begin laying the groundwork for their cognitive strategies and begin implementing cognitive technologies, or risk being left behind.

Companies should expect their established competitors to eventually adopt cognitive technologies, and be aware that many are doing so now. However, a bigger threat may come from tech-centric players who aren't afraid to develop business models around technology. The Googles and Amazons of the world have aggressively adopted AI and are rapidly moving into new business domains. Companies should brace themselves for a wave of similar threats from new ventures built on cognitive technology from the ground up. Companies that ignore the power of these technologies and the business processes and models they enable will be at a considerable disadvantage as we move rapidly into a cognitively enabled world.

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ABOUT THE AUTHORS

Thomas H. Davenport ([@tdav](#)) is the President's Distinguished Professor of IT and Management at Babson College in Wellesley, Massachusetts; a fellow at the MIT Initiative on the Digital Economy and at NewVantage Partners; and a senior adviser to Deloitte Analytics. Vikram Mahidhar ([@vikram_mit](#)) is head of AI business at Genpact, a professional services firm focused on delivering digital transformation based in New York.



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