Fast start in cognitive innovation

Top performers share how they are moving quickly

IBM Institute for Business Value

How IBM can help

Clients can realize the full potential of big data and analytics with expertise, solutions and capabilities needed to infuse cognitive into virtually every business decision and process; empower more rapid and certain action by capitalizing on many forms of data and insights; and develop a culture of trust and confidence through a proactive approach to security, governance and compliance. For more information about IBM Cognitive and Analytics offerings from IBM, visit **ibm.com**/gbs/cognitive. For more information about cognitive solutions and cloud platforms that support cognitive workloads, visit **ibm.com**/cognitive.

Discover what "cognitive innovators" are doing differently

How will cognitive computing transform lives, both personally and professionally? What can enterprises do to tap into cognitive computing's full potential? What steps can leaders take today to accelerate cognitive computing benefits? In our largest and most diverse survey of business leaders to date, we explore these and many other questions. In this report leveraging a survey of 6,050 C-suite executives worldwide, we identify a small group of cognitive innovators and reveal what they are doing differently. Their most successful strategies combine cognitive and analytic capabilities – including machine and deep learning, natural language processing, descriptive and predictive analytics – as well as robotics and automation.

Overview

Computing underpins our daily lives. Starting when we wake up in the morning until we settle in for the night, computers are at the center of much of what we do. But conventional computing has binding limitations and constraints – it is programmed, governed by an a priori set of rules and logic informed by data that is often neatly organized into a set of orderly and structured rows and columns. However, the real world in which we live is anything but orderly or structured.

The next wave of technology – cognitive computing – is already helping us make sense of the deluge of data out there, providing systems that are able to adapt and learn. And it promises to do much more. By expanding digital intelligence exponentially, cognitive technologies possess the ability to deepen and broaden human capabilities profoundly.

To help clients better plan and act, the IBM Institute for Business Value (IBV), in collaboration with Oxford Economics, surveyed more than 6,000 business leaders worldwide – our largest IBV study sample of executive opinion since we started conducting primary research in the year 2000. Here, in part one of a two-part series, we focus on the market view of cognitive capabilities: what the technology entails, how innovative leaders are already acquiring these skills and what they expect to gain. Later, our next report will explore which enterprise functions and roles are the highest priorities for cognitive computing, and how executives plan to overcome barriers to gain the most from cognitive capabilities.

88%

of outperformers expect cognitive computing to play an important role in their organizations' future

46%

of outperformers have adopted cognitive technologies versus 11% of underperforming peers

47%

of surveyed CEOs said innovation will be their most important day-to-day business activity within 3 years

In a related study earlier in 2016, the IBV explored how companies were using advanced analytics and other technologies to lay the foundation for adopting cognitive from among this same group of respondents.[1] In this study, we wanted to better understand their considerations, expectations and objectives in applying cognitive solutions to the most pressing business challenges and opportunities.

From synthesizing and correlating the world's knowledge to help cure previously incurable disease, to improving public safety by anticipating likely criminal activity, to providing human-like engagement and care for the elderly and the infirm, cognitive computing offers new possibilities and potential. And it can be used in practical, profitable and pragmatic ways – providing executives with insights on demand.

Imagine a world…

What if, while traveling to work, your vehicle detects that you are about to suffer a major medical event and instantly routes real-time data to nearby healthcare professionals? Then it optimizes treatment options based on the latest research and delivers you to the facility best-equipped to provide immediate, world-class medical care. And it does this while arranging pre-approval with your insurer and notifying your closest family member, friend and/or employer of the incident.

Or imagine a corporate attorney who, during a due diligence effort, does not have to rely on the days or weeks of manual labor by outside firms and team paralegals to sift through mountains of documents. Instead, a system learns from those individuals about what is important in this case, ingests thousands of documents, and then makes recommendations about where best to focus, saving time and money.

Or envision that your holiday plans are instantly reconfigured based on your personal virtual concierge's knowledge of your interests and preferences – taking into consideration a disruptive weather event halfway around the world, of which you were not even aware.

These and many other real-life experiences are not only becoming possible, but more prevalent, underwritten by cognitive technologies. Artificial intelligence technologies such as machine learning, deep learning and natural language processing can be combined with enriched predictive and descriptive analytics, as well as complemented by robotics and sophisticated automation. Cognitive computing is delivering entirely new types of customer engagement, strategic innovation and business transformation.

Executives who are leading the way in applying cognitive capabilities to their businesses convey a clear message. It is not only central to their strategic visions, but the economics support a business case in which new business and better customer engagement can drive the revenues and cost savings necessary to support cognitive investments. These trailblazers are already investing with clear expectations of gaining competitive advantage, driving innovation, and capturing financial remuneration in the form of revenue growth, process efficiencies, and improved customer engagement and experience.

Addressing business disruption with cognitive

Over four hundred of the executives we surveyed are CEOs and over five hundred were CFOs, similar to the number of CMOs.

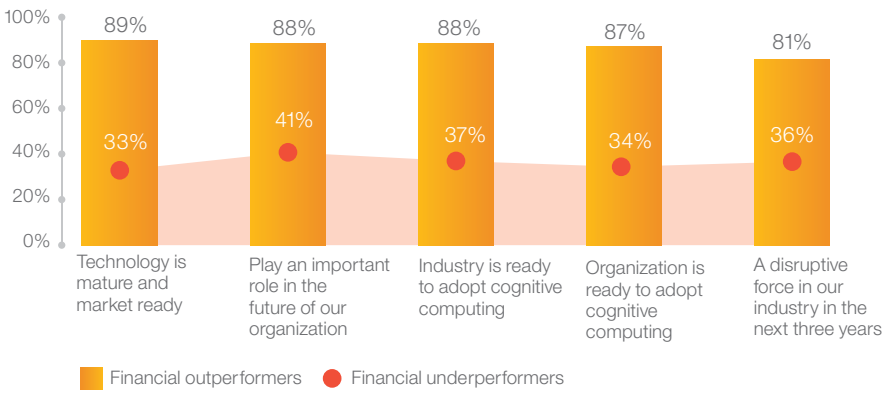
Of our CEO respondents, 54 percent said that business disruption will increase significantly in the next few years, and 47 percent said innovation will be their single most important day-to-day business activity within three years. Eighty-eight percent of all the highest-performing organizations surveyed report that one particular innovation – cognitive computing – is inevitable in their industry. They also said their organizations either have or are ready to embrace the technology.

Analysis reveals that innovation capability is highly correlated with business performance. Among those surveyed, fully 95 percent of the highest-performing organizations – in terms of both revenue growth and operating efficiency – see themselves as innovators. And they see cognitive computing as central to their innovation success.

Eighty-eight percent expect cognitive computing, with its broad range of benefits, to play an important role in the future (see Figure 1). What's more, 89 percent of these highest-performers said cognitive technologies are already mature and market-ready.

Figure 1

Cognitive technologies are essential and ready to be deployed



Source: IBM Institute for Business Value survey on cognitive computing in collaboration with Oxford Economics, 2016.

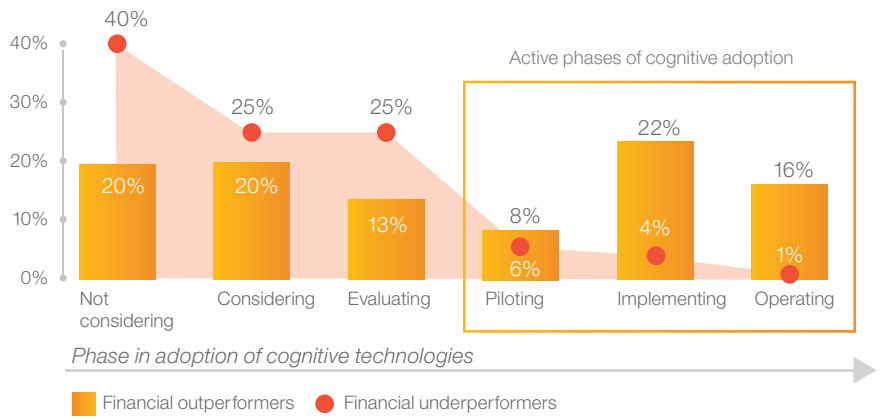
Increasingly, business leaders recognize the transformational benefits of cognitive technologies, particularly the abilities to:

- Dramatically scale human expertise cost-effectively
- Significantly improve business decision-making processes, and
- Produce deeper, sounder business insights.

Given these potential benefits, a majority of high-performing companies have already begun or are planning to adopt cognitive computing. And nearly half (46 percent) are already either piloting, implementing or operating cognitive technologies today, versus only 11 percent of the lower-performing peers (see Figure 2).

Figure 2

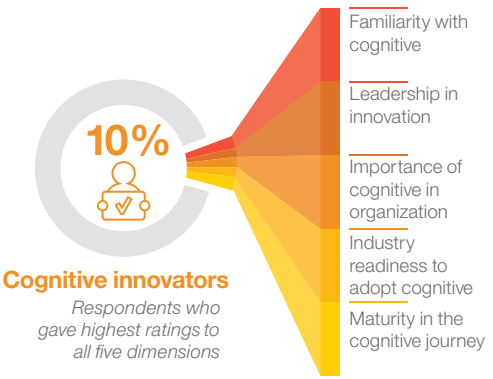
Advancing the cognitive journey



Source: IBM Institute for Business Value survey on cognitive computing in collaboration with Oxford Economics, 2016.

Figure 3

Defining cognitive innovators



Source: IBM Institute for Business Value survey on cognitive computing in collaboration with Oxford Economics, 2016; IBM Institute for Business Value analysis.

What cognitive innovators are doing differently

To better understand specific attitudes and actions that optimize benefits from cognitive investment, we have defined a subset of our respondent group that is leading the pack. These cognitive innovators represent approximately 10 percent of executives surveyed (see Figure 3) – an elite group defined by a strategic approach to adopting cognitive technologies.

Cognitive innovators rank highest across five specific dimensions:

- Familiarity with cognitive technologies and concepts
- Leadership in innovation
- Understanding that cognitive capabilities are important to their organizations
- Willingness of their industry to adopt cognitive computing
- Demonstrable actions indicating that they have already begun their cognitive journeys.

While this group represents all the surveyed industries and geographies, almost three times as many cognitive innovators were high performers compared to our global respondent average, in terms of revenue growth and operating efficiency.[2]

Cognitive innovators' behavior differs distinctly from all others surveyed. Even today, they invest twice as much on cognitive technologies than others. They expect significantly higher returns from such investments: 21 percent return on investment (ROI) versus 14 percent, on average, among other firms. They also expect to create three times as much business value from cognitive computing than their peers.

Analysis of surveyed executives' ROI expectations combined with IDC investment forecasts reveal that cognitive technologies are estimated to yield almost USD 5 billion annually in net benefit within three years.[3] This is based on estimated spend of over USD 31 billion in 2019

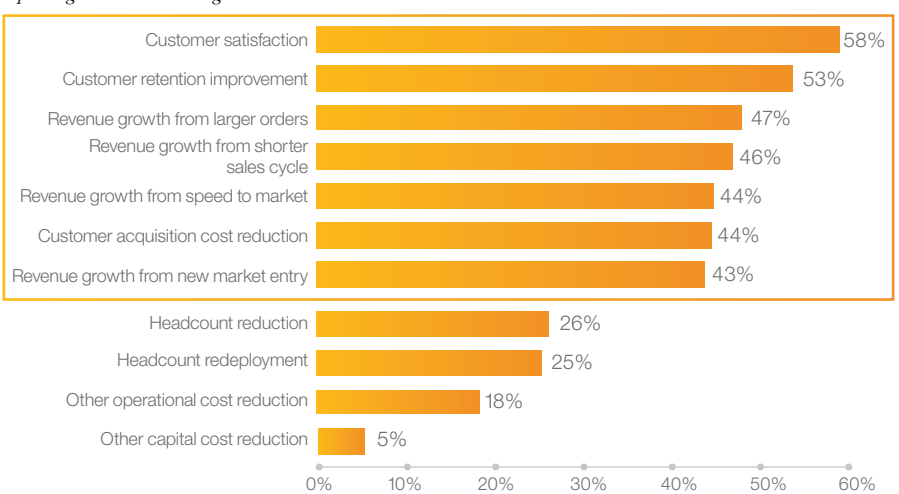
and a five-year compound annual growth rate of 55 percent. Cognitive innovators are looking to capture the lion's share of this growth.[4]

Cognitive innovators identify customer satisfaction, retention, acquisition and revenue growth as the primary rationale for embracing cognitive technologies, and see cognitive capabilities as the central key to driving new revenue and dramatically improved customer experience (see Figure 4).

Early success stories of cognitive innovation abound.

Figure 4

Top-line growth motivates cognitive investment



Source: IBM Institute for Business Value survey on cognitive computing in collaboration with Oxford Economics, 2016.

Innovative customer service with a smile

A prominent commercial bank headquartered in southeast Asia sought to accelerate innovation and transformation of customers' banking experience across all of its channels. The bank created a humanistic robot based on cognitive technologies that is able to talk to customers in an intimate and compelling way. With facial recognition technology, natural language processing, and probabilistic reasoning based on structured and unstructured data sources, the robot can calibrate interactions to respond based on combining knowledge built in the past with what it continues to learn. The robot has become integral in launching new digital branches across major markets, allowing staff to focus on higher-value customer engagement.

Improving safety of the most important asset

A top global automotive manufacturer struggled to glean meaningful insights from a constant flow of detailed customer feedback and official incident reports. To respond to customers more effectively, the manufacturer developed a cognitive-based analytical approach with natural language processing, and robust analytics and prediction tools to more efficiently pinpoint potential issues, and define and test likely solutions. It improved overall safety by reducing the likelihood of defective components with 50 percent fewer new car problems in the first three months of ownership and 50 percent fewer defective components from third-party suppliers. Faster decision making has accelerated problem resolution by more than half.

Aiming to make outages a thing of the past

A leading global oil and gas producer, processor and marketer, had reached proficiency in detecting likely equipment outages using traditional analytical approaches. However, they were missing a significant share of outage events, since the mix of critical warning indicators was becoming increasingly too complex to discern from the flood of noisy sensor-generated data. The company implemented cognitive technologies, including machine-learning

algorithms that were able to use historical and concurrent data to dramatically improve predictive capability over time. The new cognitive system has achieved a 95 percent improvement in outage event detection, which subsequently reduced production outages and significantly increased productivity.

Breaking new ground in Brazil's banking industry

A leading banking and financial services business in Brazil employed cognitive computing to become more diversified and gain competitive advantage amid intensifying competition in the country's banking industry. The first in Brazil to use cognitive technologies, the bank employs self-learning capabilities to interact with agents through spoken and written inquiries in Portuguese. The new virtual attendant solution has been able to achieve an approximately 70 percent accuracy rate for both written inquiries and spoken-language inquiries, and its accuracy continues to improve with every interaction. Agent satisfaction has grown significantly as a result.

Cognitive innovators are successfully identifying and investing in tangible applications of cognitive technologies. In doing so, they are making it much more difficult for competitors to catch up. Unlike many other innovations, cognitive technologies are characterized by strong elements of network economics, and economies of experience and scale. As machines learn continuously, they help companies leave their competitors with more static systems further behind.

The impact and precision of cognitive computing increases with time as predictive insights improve in accuracy with subsequent interactions. In so doing, cognitive technologies significantly favor early movers. And improvement tends to be exponential, meaning that whoever gets to market first could have a major advantage in staying ahead, leaving those competitors who are late to the game behind at ever-increasing speed.

How to become a cognitive innovator

Make innovation central to business vision, strategy and execution – and aim for a first-mover advantage

Create a competency to identify business problems that cognitive technologies can help solve – then define the value and make appropriate investments

Create customer experiences that engage, delight and amaze

Confirm that your data strategy targets the information needed to address identified problems

Adopt an approach of agile iteration and continuous improvement.

Strategies to becoming a cognitive innovator

With cognitive technology rapidly growing in maturity and the economics favoring first movers, organizations will want to consider immediate action in pursuit of cognitive innovation (see sidebar, “How to become a cognitive innovator”).

Cognitive innovators commit themselves to the transformational potential of cognitive technologies and are willing to make necessary investments to make transformation a reality.

Innovation has long differentiated the most successful organizations from their peers. Numerous IBM Institute for Business Value studies demonstrate the point.[5] But believing in the power of innovation is not sufficient for outperformance. Organizations need to live innovation every day.

Several actions help define which organizations are truly innovation leaders and which lag behind:

- Embed and align innovation to business strategy
- Establish well-defined processes and metrics to facilitate and guide new innovations
- Maintain an open footing by encouraging collaboration with customers and ecosystem partners, and
- Focus leaders on actively evolving the underlying business culture.[6]

Cognitive innovators are also committed to staying ahead of changing needs of markets and their constituents by embracing new and emerging technologies. There was once a time when general consensus suggested that the safest and most lucrative position, in terms of technology adoption, was to be a fast follower rather than an early disruptor. Those days have gone.

Technological innovation is happening so rapidly that fast followers are quickly left behind. Recent evidence from the 2016 IBM Institute for Business Value CEO point of view shows that the most successful surveyed organizations aggressively pursued a posture of early experimenter.[7]

Cognitive innovators constantly re-assess business challenges and opportunities. They scan what is new and possible from emergent technologies in advancing their transformation agendas. They are willing to experiment and invest and are already well-positioned to gain significant competitive advantage based on cognitive computing.

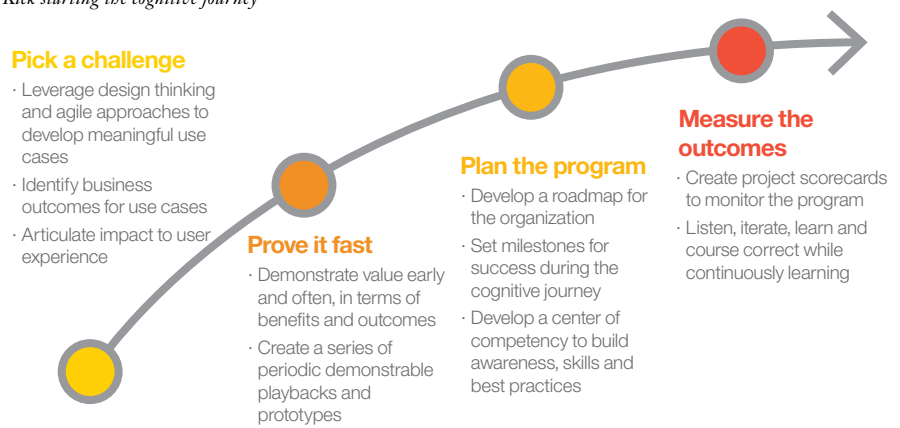
Cognitive innovators have already begun applying the technologies to specific functions and activities. Leading insurers such as RIMAC Seguros, Peru's largest provider of insurance products and services, is transforming claims processing for health insurance policies.[8] And a number of companies, including Satisfy and Influential, are using cognitive computing to create significantly richer, deeper and more personal customer experiences.[9]

From baby step to giant leap

As with the embrace of other emergent technologies, the most important step in the cognitive adoption journey is the first. And it is vitally important to select carefully, pilot and demonstrate success along the way (see Figure 5).

Figure 5

Kick starting the cognitive journey



Source: IBM Institute for Business Value analysis.

Pick a challenge

Use design thinking or other agile approaches to identify a small number of high-value business problems where cognitive technologies can play a role. Define value by building meaningful use cases for specific functions and activities, and identify business outcomes that would derive from investments. Articulate the impacts to the customer or user experience.

Prove it fast

Adopt a philosophy of demonstrating value from cognitive investments early and often. As with other types of innovation, even with management support, long-term commitment to new investments will only be sustainable if benefits and outcomes are clearly measured and communicated. At the same time, create a series of prototypes and pilots to make the investments tangible – and educate stakeholders about how cognitive solutions work.

Plan the program

Conceptualize each separate initiative as part of a broader program of cognitive transformation. Identify the critical data sets for cognitive learning. Think through not only the direct impact of each initiative, but how they relate to each other. And demonstrate how, when combined, they create something altogether more powerful. Develop a roadmap for execution and specific milestones for success. Create a center of competency to start building awareness and skills to support cognitive strategies and technologies.

Measure the outcomes

Create a series of project evaluations and an overarching program scorecard to help monitor and quantify outcomes. Listen, learn, iterate and adjust course as necessary in pursuit of higher value.

Are you ready to start innovating with cognitive technologies?

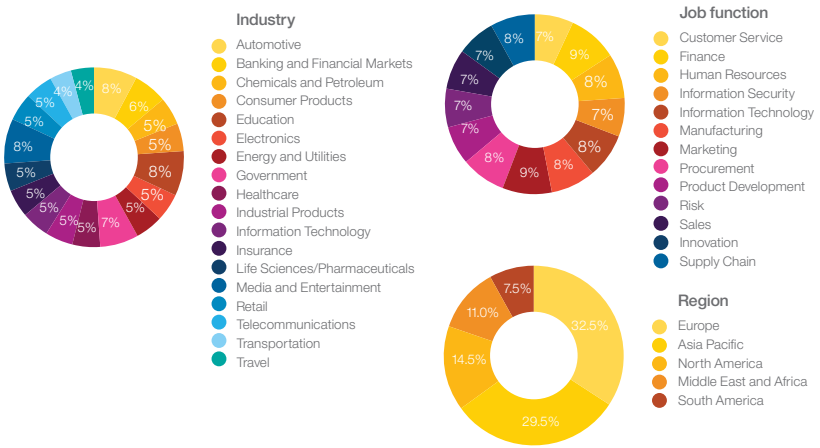
- How will you assess the business opportunities that cognitive computing offers your organization?
- What is your plan to encourage and support systematic innovation, including rapid expansion of how you can leverage cognitive technologies?
- In what ways will you verify that your data strategy targets the information necessary to solve important business problems?
- How can your organization collaborate to implement cognitive technologies? How will you define and measure against agreed-upon success milestones?
- How will you build on early results for even greater returns over time?

Study approach and methodology

In cooperation with Oxford Economics, the IBM Institute for Business Value surveyed 6,050 global executives representing 18 industries, including leaders of government departments and educational institutions. Roles of responding executives included major C-suite members – CEOs, CMOs, CFOs, CIOs, COOs and CHROs – as well as heads of customer service, information security, innovation, manufacturing, risk, procurement, product development and sales (see Figure 6).

Figure 6

Global technology survey respondents



Source: IBM Institute for Business Value survey on cognitive computing in collaboration with Oxford Economics, 2016.

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Related IBV reports

Brill, Jim, Likhit Wagle, Allan Harper, Nicholas Drury. "The Cognitive Bank: Decoding data to bolster growth and transform the enterprise." IBM Institute for Business Value. September 2016. http://www.ibm.biz/cognitivebank

Ezry, Rafael, Dr. Michael Haydock, Bruce Tyler and Rebecca Shockley. "Analytics: Dawn of the Cognitive Era." IBM Institute for Business Value. October 2016. http://www.ibm.com/business/value/2016analytics/

Sarkar, Sandipan and David Zaharchuk. "Your cognitive future – How next-gen computing changes the way we live and work, Part I: The evolution of cognitive." IBM Institute for Business Value. January 2015. http://www.ibm.com/business/value/cognitivefuture

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Notes and sources

1 Ezry, Rafael, Dr. Michael Haydock , Bruce Tyler and Rebecca Shockley. “Analytics: Dawn of the Cognitive Era.” IBM Institute for Business Value. October 2016. http://www.ibm.com/business/value/2016analytics/

2 IBM Institute for Business Value survey on cognitive computing in collaboration with Oxford Economics, 2016; IBM Institute for Business Value analysis.

3 Daquila, Marianne and Jessica Goepfert. “Worldwide Semiannual Cognitive Systems Spending by Vertical Market 2016–2019 Forecast.” IDC. March 2016. http://www.idc.com/getdoc.jsp?containerId=prUS41072216

4 Ibid.

5 “Redefining Competition: Insights from the Global C-suite Study – The CEO perspective.” IBM Institute for Business Value. January 2016. http://www-935.ibm.com/services/c-suite/study/studies/ceo-study/; Marshall, Anthony and Ikeda, Kazuaki. “More than magic: How the most successful organizations innovate.” IBM Institute for Business Value. April 2016. http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=GBE03625USEN; Marshall, Anthony, Mieke de Rooij and Mauro Biscotti. “Insatiable innovation: From sporadic to systemic.” IBM Institute for Business Value. June 2013. http://www-935.ibm.com/services/us/gbs/thoughtleadership/insatiableinnovation/

6 Marshall, Anthony and Ikeda, Kazuaki. “More than magic: How the most successful organizations innovate.” IBM Institute for Business Value. April 2016. http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=GBE03625USEN

7 IBM Institute for Business Value. “Redefining Competition: Insights from the Global C-suite Study – The CEO perspective.” January 2016. http://www-935.ibm.com/services/c-suite/study/studies/ceo-study/

8 Bedell, Craig, Christian Bieck, John Franzis, Anthony Marshall and Sandipan Sarkar. “Understanding customers and risk: Your cognitive future in the insurance industry.” IBM Institute for Business Value. October 2015. https://public.dhe.ibm.com/common/ssi/ecm/gb/en/gbe03710usen/GBE03710USEN.PDF

9 Davis, Gary, Anthony Marshall, Keith Mercier and Sandipan Sarkar. “Thinking like a customer: Your cognitive future in the retail industry.” IBM Institute for Business Value. October 2015. https://public.dhe.ibm.com/common/ssi/ecm/gb/en/gbe03731usen/GBE03731USEN.PDF

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