# The cognitive CFO

*How "leaders" are increasing finance IQ*

**Executive Report**

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## Preparing for cognitive capabilities

*For Chief Financial Officers (CFOs), it is no longer enough to understand what has happened and apply that to what might happen in the future. Economic volatility and uncertainty, new competitors and disruptive innovation highlight the need to more quickly deepen and accelerate understanding of what is going on. The application of cognitive computing can help uncover previously unknown opportunities to improve operational efficiency and create the potential for faster profitable growth. In this executive report, we look at what a small group of leading finance teams are doing to ready themselves for the cognitive era.*

## Overview

Enterprises face unprecedented challenges, and finance is at the epicenter. Increasing business risk and volatility are evidenced by accelerating business disruption through disintermediation, virtualization and technical innovation. As a result, new competitors, changing business models and changing customer expectations have emerged. Pressure on CFOs to enable enterprise agility and help their businesses make better decisions is intensifying. Finance organizations must now proactively manage business growth and risk through advanced, predictive analytics, creation of meaningful business partnerships and curation and integration of enterprise data.

To do so, CFOs need to take advantage of cognitive computing — systems able to adapt and learn — to make sense of the massive amount of data confronting them. Cognitive exponentially increases the ability to digest vast amounts of data and infer potential insights with much greater speed than human or traditional computing platforms. By significantly expanding digital intelligence, cognitive technologies possess the ability to deepen and augment human understanding. This can translate into better and quicker decisions to drive innovation, improve operational efficiency and address capital investments.

To understand the degree to which executives see "real" opportunities to leverage cognitive computing capabilities, the IBM Institute for Business Value, in collaboration with Oxford Economics, surveyed more than 6,000 C-suite and heads of functions worldwide — including 524 CFO respondents. The goal was to better understand and share how executives assess how cognitive computing can help address pressing business challenges and opportunities.

This report explores the CFO perspective on the potential use cases for, and benefits of, cognitive computing. We found that top performers have established operational and analytical uses for cognitive technologies and understand their value.

CEOs say finance is one of the top-five investment areas for cognitive computing

90% of surveyed outperforming organizations agree they are ready to adopt cognitive technologies

Three times more outperformers indicate they will implement cognitive computing in finance within two years

## State of cognitive computing in finance

Cognitive computing represents a new paradigm that can significantly enhance an enterprise's ability to synthesize vast amounts of structured and unstructured data, apply machine-learning capabilities to the analysis of data and query results in natural language, thereby enhancing analysts' insights, efficiency and speed.
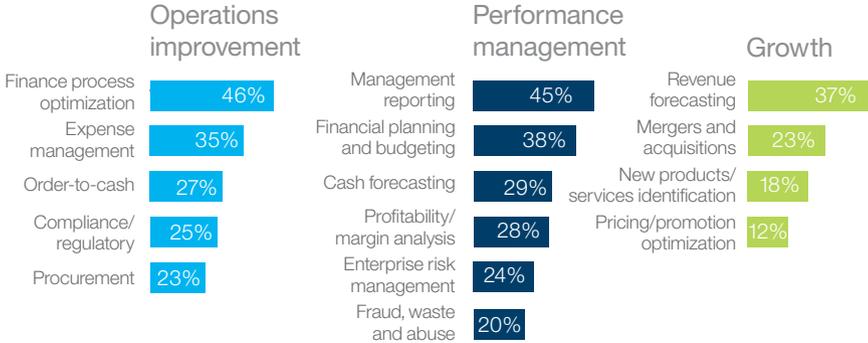
**cog·ni·tive** /ˈkägnədiv/

*adjective*

Cognitive computing refers to next-generation information systems that understand, reason, learn and interact. These systems do this by continually building knowledge and learning, understanding natural language and reasoning, and interacting more naturally with human beings than traditional programmable systems.

According to Chief Executive Officers (CEOs), finance is one of the top-five investment areas for cognitive computing (see Figure 1).[1] With so much press about artificial intelligence, it is no surprise that information technology and information security are the top areas, but these are closely followed by customer service, human resources and finance. Surveyed CFOs believe that cognitive computing can help them address challenges around decision-making, especially in the quality and insights of reporting and analytics, as well as automation of judgment-intensive activities. As a result, cognitive technologies can help finance organizations bridge the gap between undiscovered opportunities and their current capabilities.
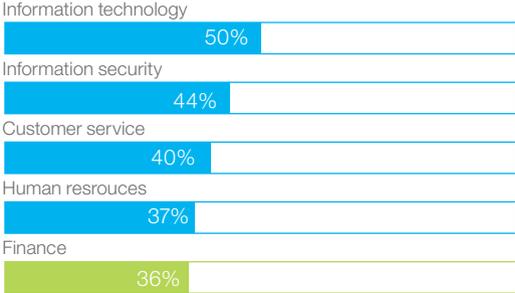
So where do finance organizations specifically want to invest in cognitive computing? In a previous study, cognitive computing priorities for finance included operations improvement, performance management and growth (see Figure 2).[2]

**Figure 1**

*How CEOs rank cognitive computing investment priorities*



Source: IBM Institute for Business Value, "IBM Cognitive Computing Survey," 2016.
Note: Other areas not shown include innovation, manufacturing, marketing, procurement, product development, risk, sales and supply chain.

**Figure 2**

*CFOs prioritize cognitive computing across finance activities*



Source: IBM Market Development & Insights, Finance analytics and cognitive customer research, June 2016.

**Advanced analytics (predictive/ prescriptive) versus cognitive systems[3]**

Advanced analytics respond to specific programmed coded requests to make determinations and analyze predefined data based on predefined parameters. Cognitive systems interact with humans naturally to interpret data and learn from virtually every interaction and propose new possibilities through probabilistic reasoning. Cognitive systems are trained but not programmed.

To improve operations, 46 percent of surveyed respondents expect to invest in cognitive computing for finance process optimization and 35 percent in expense management. Cognitive computing has helped automate finance processes that deal with large amounts of transactional data and complex decisions made by finance staff, who must select the best option among several possible answers. Sophisticated pattern recognition techniques and self-learning mechanisms can be used in expense management to identify and predict expense-fraudulent activities more accurately. In addition, cognitive technologies can help reduce costs through analysis of external market data in advance of travel to uncover the lowest air fares and hotel rates.

**Case study: Operations improvement – optimizing the record-to-report close cycle[4]**

For a media company, the close process was complex with:

- Resources from all the sub-processes involved in journal preparation and reconciliations
- Disparate distribution of workload among the team
- Lack of standard templates, process and uniform technology, resulting in errors and escalations.

Cognitive computing provided an opportunity to interpret the large volume of data and conduct process redesign to standardize and automate processes. Cognitive systems helped recognize personnel who could do the same work faster and accurately and recommended redistribution of workload. As a result, the company experienced a reduction in turnaround time by 2.2 hours and a reduction in errors to less than 0.5 percent. There was also a 24-percent increase in efficiency, and the close process is 100-percent compliant with the Sarbanes–Oxley Act of 2002.

To enhance performance, finance respondents said they plan to invest in cognitive technologies for management reporting (45 percent) and financial planning and budgeting (38 percent). Cognitive technologies have helped finance analyze data extracted across a large population of management and financial reports. They have also enabled finance staff to quickly hone in on elements of potential risk and gain deeper insights. With cognitive systems providing insight into real-time changing market conditions from both internal and external sources, finance professionals can update plans and budgets with the most current information.

**Case study: Performance management – improving forecasting[5]**

For a large pharmaceutical company, cognitive technologies help understand the precise impact of market forces on the company's market share. Machine-learning algorithms model the dynamics of the system and how various market forces interact. The system self-learns over time as the market evolves. Cognitive systems predict the impact of competitive events on market share driven by efficacy, brand value, spend and other variables. New sentiment from unstructured sources is also brought into modeling and enables complex scenario planning, such as dosage changes and competitive actions. The result is market-share predictions with more than 99-percent accuracy and less than 1-percent deviation of annual forecast against actual for a blockbuster drug.

Thirty-seven percent of respondents said they will invest in cognitive systems for revenue forecasting, and 23 percent said they will do so in mergers and acquisitions, with the primary objective of improving profitable growth. Cognitive computing can help provide insight into real-time customer attitudes and their impact on an enterprise's revenues. It could be used to analyze customer conversations on social media, present the top-trending products and services, describe the underlying drivers of each trend and provide foresights into whether the trend will rise, fall or plateau over time. In mergers and acquisitions, executives could ask in real-time for acquisition targets based on a set of company characteristics. Cognitive systems could suggest potential candidates and perform in-depth analyses, as well as rank targets to highlight value and synergistic opportunities, visualize trade-offs and explore what-if scenarios.

### Case study: Growth – Identifying hidden drivers of demand[6]

A retailer wanted to find hidden relationships between external events and consumer behavior. Although it had robust internal sales data, the company lacked an automated way to account for and interpret external events that could help explain sales fluctuations or deviations from forecasts. Machine-learning algorithms mine what is important for each product at each location. An intelligent analytical model was developed that evaluates more than 1,000 variables across seven categories (such as economic events, consumer, weather, competitors). The model quantifies the impact of abnormal events on normal sales trends across individual product categories. These "signals" are used in an array of forecasting models to identify sales anomalies. As a result, product is forward deployed using numerical optimization techniques, driven by the signals sent in the exception forecast. The supply chain operates with a new "intelligence" to keep costs low.

# Finance leaders articulate value from cognitive

How can finance organizations use cognitive computing to capitalize on new capabilities? To help answer this question, we used survey results to identify a small group of finance outperformers – 14 percent of study participants. This group self-reported that they have significantly outperformed on revenue growth over the past three years and have been significantly more efficient and profitable.

By learning from these leaders, other finance organizations can understand the potential to excel in the cognitive era. They can begin to:
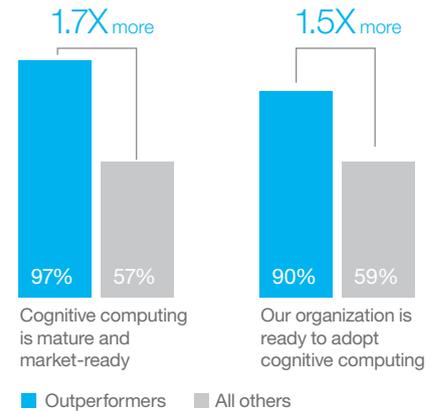
- Create a culture for cognitive
- Build a cognitive data foundation
- Focus on skills and staffing.

**Creating a culture for cognitive**

Our survey indicates that organizations embracing cognitive tend to be "bolder," more agile and have a higher appetite to move first and innovate. They are more likely than others to embrace learning and the science of insight, as well as foster a culture where that knowledge is infused into decision making. These firms say they are confident their organizations are ready to embrace a cognitive future. Ninety-seven percent of outperformers say they believe that cognitive computing is market-ready. Ninety percent of these leaders indicate their organizations are ready to adopt cognitive computing, compared to 59 percent of all others (see Figure 3).

**Figure 3**
*Finance outperformers embrace the science of cognitive*



| | |
|---|---|
| 1.7X more | 1.5X more |
| 97% 57% | 90% 59% |
| Cognitive computing is mature and market-ready | Our organization is ready to adopt cognitive computing |

■ Outperformers　■ All others

*Source: IBM Institute for Business Value, "IBM Cognitive Computing Survey," 2016.*

The potential to improve enterprise agility and expand the speed, insights and capability of organizations presents significant opportunities. Finance outperformers say they expect to use cognitive technologies to reap rewards in specific activities in operations improvement, performance management and growth. In operations improvement, our study shows that outperformers say they recognize that cognitive computing can improve efficiency in order-to-cash (75 percent of outperformers versus 39 percent of peers) and regulatory and statutory monitoring/compliance/reporting (48 percent of outperformers versus 22 percent of peers) and improve effectiveness in procure-to-pay (59 percent of outperformers versus 34 percent of peers). Cognitive technologies can provide data mining, pattern recognition and natural language processing to mimic the human brain's processes of buying goods and services.

In performance management, outperformers indicate that cognitive computing can reduce risk and increase insights. Sixty-six percent of outperformers say that cognitive technologies can help them reduce risk in treasury/cash management, versus 40 percent of all others. Cognitive systems can help provide analysis into various drivers, such as seasonality, trends, social media and more to increase cash forecasting accuracy. And 60 percent of outperformers say they believe that cognitive computing will increase performance insights for strategic and operational planning, budgeting and forecasting, versus 40 percent of all others. Cognitive technologies can provide visibility into real-time changing market conditions to help update plans and budgets.

For growth, 65 percent of outperformers say they believe cognitive technologies will help them improve decision-making in evaluating mergers and acquisitions opportunities, versus 33 percent of all others. In addition, 57 percent of outperformers say that cognitive systems can assist in reducing risks around supporting organic growth strategies, versus 34 percent of all others. For example, cognitive computing could analyze diverse types of customer data in finding personality insights/types/segments to help price products and services and run campaigns and promotions effectively.

Given the potential benefits, we believe, based on our study results, that finance outperformers are more likely to adopt cognitive computing sooner than their peers – compared to others in our study, three times more outperformers indicate they will implement cognitive within two years.

**Course of action:**
Adopting a mindset that embraces the science of cognitive computing is a key step in the journey. It includes a willingness and a commitment to infuse insight into decision-making. Setting an enterprise-wide cognitive strategy can help provide direction and establish specific actions for integration across the CEO priorities of information technology, information security, customer service, human resources and finance.

Cognitive solutions are well-suited to a defined set of challenges in which humans and existing technologies cannot properly and quickly synthesize and uncover unknown high-impact opportunities. As a result, CFOs need to pinpoint a small number of high-value functions where cognitive technologies can play a role. Areas of interest might include those that today take humans an inordinate amount of time to seek timely answers and insights from various information sources, requires ranked responses to questions and queries and that can leverage new data sources to improve decision-making capabilities.

The order-to-cash area is a good example. In collections, a customer 360-view-based risk assessment, using structured and unstructured data from different systems, can be created with cognitive systems. In dispute/deduction management, cognitive technologies can be used to identify and allocate queries from customers that come through email (unstructured) and workflow (structured). The technology can also provide a query agent a complete statistics view on risk associated with a customer, as well as how much accounts receivables are open for collection.

We believe organizations should start the cognitive journey by identifying the uses cases and associated benefits provided by cognitive computing. The order-to-cash cognitive computing example for collections provides cash flow benefits. Cognitive dispute management can lead to improved productivity.

**Building a cognitive data foundation**
Finance has historically used huge amounts of financial transaction data — often challenging and time consuming. But now, a tsunami of data comes from different sources, such as external market-centric data, competitive data, macro-economic data, social media and weather data. And this non-financial data needs to be integrated with the financial data to create new insights. With traditional methods of enterprise-resource-planning systems, spreadsheets and online analytical processing (OLAP) tools, these challenges will be exacerbated. It, therefore, becomes imperative that a modern data architecture has the ability to ingest and digest the 4Vs of data (volume, variety, velocity and veracity) from both internal and external sources, and then integrate that data into enterprise processes.[7] The need for these capabilities is amplified in the cognitive era (see Figure 4).

**Figure 4**

*Cognitive computing has a dramatic impact on enterprise information demands*

| | Traditional | Cognitive |
|---|---|---|
| Information elements | • Finance transactional<br>• Volumetric/statistical | • Social<br>• Demographic<br>• Economic<br>• Meteorological |
| Information types | • Structured<br>• Rule-based (GAAP, IFRS) | • Unstructured |
| Information time horizon | • Periodicity<br>• Quarterly, yearly historic<br>• 12-month planning | • Real-time<br>• Predictive |
| Information lead times | • SEC calendar driven | • Immediate<br>• Anticipatory |
| Information uses | • Historic<br>• Explanation/attribution | • Strategy development and adjustment<br>• Revenue growth<br>• Anticipate events |

*Source: IBM Global Business Services.*

Our study shows that finance outperformers outpace their peers in the adoption of the components needed for a modern data infrastructure. These leaders have indicated they have invested twice as much as others in cloud-based data storage or analytics services, streaming data acquisition, shared operational information, data curation services and distributed storage and processing (see Figure 5). In addition, 56 percent of finance outperformers say they have implemented or plan to implement data digitization to support cognitive computing.

**Figure 5**

*Finance outperformers indicate they outpace all others in their adoption of the components needed for a modern data ecosystem*



| 2.1X more | 2.3X more | 2.1X more | 2.2X more | 2.2X more |

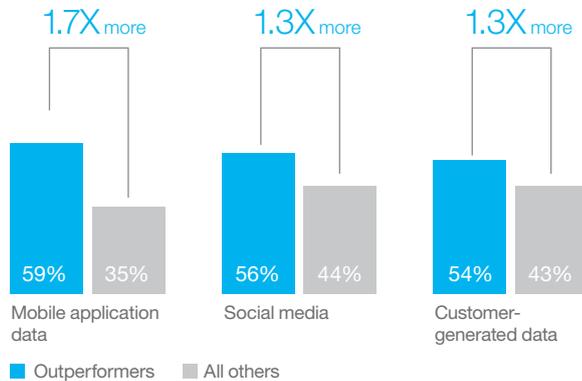| 70% | 33% | 67% | 29% | 67% | 32% | 64% | 30% | 54% | 25% |
| Cloud-based data storage or analytics services | Streaming data acquisition and analysis | Shared operational information | Data curation services | Distributed storage and processing platform |

■ Outperformers   ■ All others
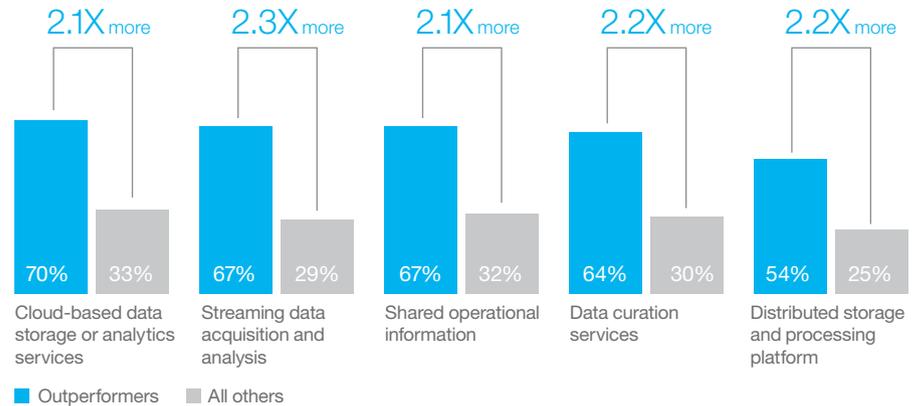
*Source: IBM Institute for Business Value, "IBM Cognitive Computing Survey", 2016.*

Cognitive systems can ingest and provide a wide variety of data sources, both internal and external to the organization. CFOs recognize a combination of financial and non-financial data as critical to accelerate the uncovering of new analytical insights. Cognitive systems are well-suited to handle large volumes of mixed data types. Most CFOs in our study say the most important data sources to finance are finance transactional systems, customer profiling/segmentation, workforce data and supply-chain data. Data from our study reveals that outperformers are additionally focused on leveraging more external data (see Figure 6).

**Figure 6**

*Finance outperformers leverage external data*



1.7X more    1.3X more    1.3X more

Mobile application data: 59% Outperformers / 35% All others
Social media: 56% Outperformers / 44% All others
Customer-generated data: 54% Outperformers / 43% All others

■ Outperformers    ■ All others

*Source: IBM Institute for Business Value, "IBM Cognitive Computing Survey", 2016.*

**Course of action:**

Most organizations indicate they do not have the data infrastructure needed to support cognitive systems. By improving the ability to rapidly ingest new data, curate integrated information and analyze that data to gain insights and deploy new capabilities at a reduced cost, finance can provide the partnering that the business demands and requires.

Data digitization is a critical part of taking advantage of cognitive computing. It is the process by which physical or manual records, such as text, images, video, and audio, are converted into digital forms. This is particularly important for "document-" and "unstructured-data" heavy processes, such as order-to-cash, to convert remittance advice received from customers that is in different forms, such as email, fax, PDF files, and pictures, into structured data.

Cognitive systems create opportunities to expand the sources of data and more quickly ingest, process and draw inferences from the information. Structured data can be augmented with new sources of unstructured data or information from external sources. Cognitive systems can support ingesting and analyzing mobile, social and customer-related data. As a result, finance organizations can leverage both internal and external data to help address market changes and improve their operations, thereby contributing to understanding customers better, leading to improving the customer "experience."

**Focusing on skills and staffing**

With a deluge of data, organizations need a clarity of vision around the data — who owns it, what it means and how it should be managed. Outperformers drive clear data governance through a Chief Data Officer (CDO) or an equivalent position — a peer to the CFO. The CDO is a business leader who defines, develops and implements the strategy and methods by which the organization acquires, manages, analyzes and governs data. Sixty-one percent of outperformers have a CDO, versus 45 percent of their peers. In addition, the CDO is supplemented by a business-driven information-governance committee — 47 percent of outperformers have a governance committee, compared to just 26 percent of all others.

Leaders in our study have adopted the use of centers of excellence for analytics/cognitive computing 53 percent more than their peers. This helps create service scalability. In terms of scope, a previous IBM Institute for Business Value study identified that outperformers are holistically placing many finance activities into a center to focus on growth, manage risks and improve efficiency.[8] Activities include finance process optimization, revenue forecasting, enterprise risk management, pricing and promotion optimization, fraud, waste and abuse and new products/services identification.

With the transition to cognitive computing, outperformers realize they need "new-collar" skills and talent necessary to move forward. The leaders are targeting specific skills: statisticians, the best data analysts, data visualization specialists, advanced mathematical modelers and big data-related information management specialists (see Figure 7).

**Figure 7**

*Finance outperformers have the new skills to support analytics and cognitive computing*
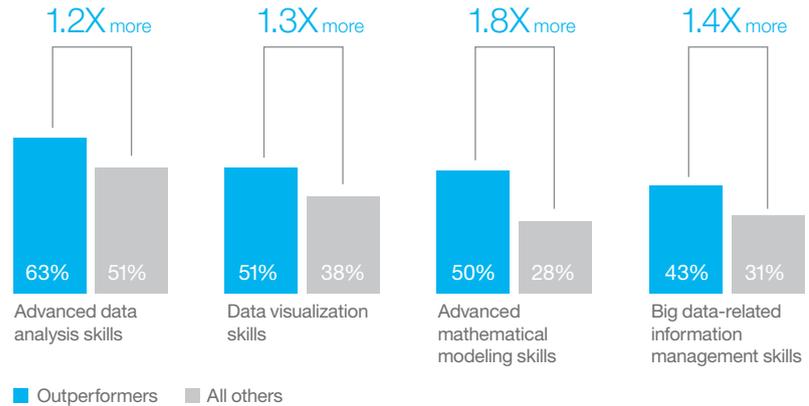


Source: IBM Institute for Business Value, "IBM Cognitive Computing Survey", 2016.

**Course of action:**

Organizations can accelerate their cognitive journeys by putting in place strong data management at the enterprise level to complement CFO leadership. A CDO and business-driven governance system creates enterprise-wide data commonality, lineage and transparency. This commonality aligns with common finance data definitions and a standard financial chart of accounts.

Finance organizations should aggregate analytics and cognitive skills to make the best use of economies of scale. The scope should include activities targeting revenue growth and risk management.

CFOs will also need to assess the impact of cognitive on jobs and augment in-house talent. Finance organizations should seek talent to diversify their existing teams — analytic breadth, data skills and modelling specialists. Organizations need to think strategically and seek candidates — whether acquired or hired — whose skills vary from those within their teams.

## Are you ready to start using cognitive technologies?

As you consider the introduction of cognitive into your finance organization, think about these key questions:
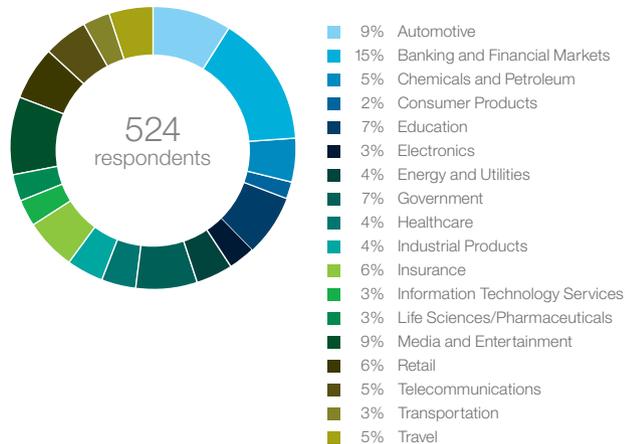
- Which areas within finance do you think could benefit from cognitive computing and what can you do to get rapid paybacks?

- What is your plan to encourage and support profitable growth, including rapid expansion of how you can leverage cognitive technologies?

- How effective is your organization in bringing together data from various sources to make decisions?

- How can your organization collaborate to implement cognitive technologies?

- What new skills or competencies would be required to take advantage of cognitive computing?

## 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. There were 524 CFO respondents who participated in the study (see Figure 8).

**Figure 8**
*Firmographics of CFO respondents*



|     |                                   |
|-----|-----------------------------------|
| 9%  | Automotive                        |
| 15% | Banking and Financial Markets     |
| 5%  | Chemicals and Petroleum           |
| 2%  | Consumer Products                 |
| 7%  | Education                         |
| 3%  | Electronics                       |
| 4%  | Energy and Utilities              |
| 7%  | Government                        |
| 4%  | Healthcare                        |
| 4%  | Industrial Products               |
| 6%  | Insurance                         |
| 3%  | Information Technology Services   |
| 3%  | Life Sciences/Pharmaceuticals     |
| 9%  | Media and Entertainment           |
| 6%  | Retail                            |
| 5%  | Telecommunications                |
| 3%  | Transportation                    |
| 5%  | Travel                            |

524 respondents

*Source: IBM Institute for Business Value, "IBM Cognitive Computing Survey", 2016.*

## For more information

To learn more about this IBM Institute for Business Value study, please contact us at iibv@us.ibm.com. Follow @IBMIBV on Twitter, and for a full catalog of our research or to subscribe to our monthly newsletter, visit: **ibm.com**/iibv.

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**Notes and sources**

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