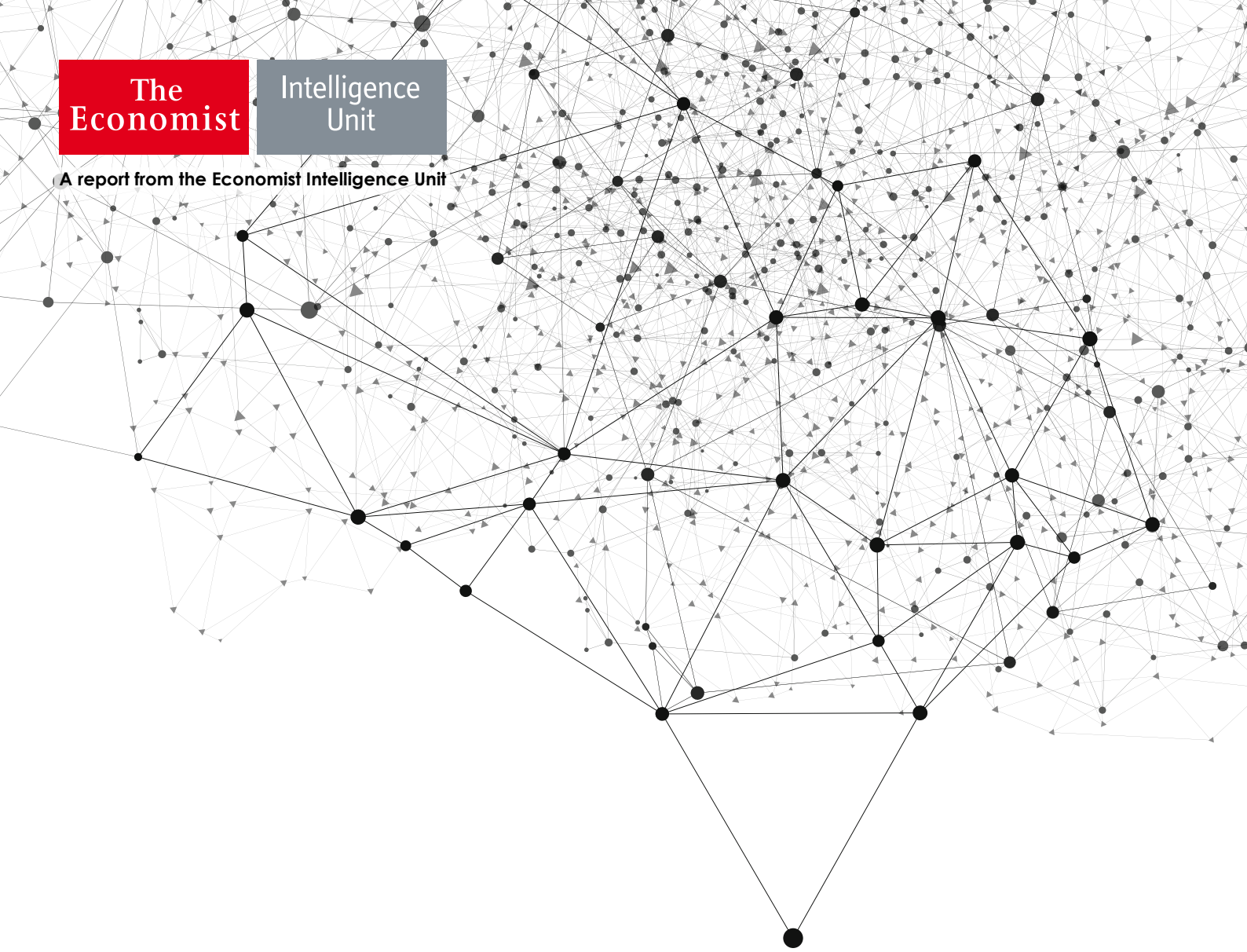


The Economist Intelligence Unit

A report from the Economist Intelligence Unit

Big data evolution:

Forging new corporate capabilities for the long term

Sponsored by sas

Contents

About this report

Big data evolution: forging new corporate capabilities for the long term is an Economist Intelligence Unit report, sponsored by SAS. It explores how far along companies are on their data journey and how they can best exploit the massive amounts of data they are collecting.

The Economist Intelligence Unit bears sole responsibility for the content of this report. The findings do not necessarily reflect the views of the sponsor.

The paper draws on two main sources for its research and findings:

- A global survey of 550 executives, conducted in February 2015. Thirty percent of respondents were C-level or board-level executives, and all were from companies with annual revenue in excess of US$50m. Each 30% percent of respondents were from Western Europe, North America and Asia. The remainder hailed from the Middle East and Africa (5%) and Latin America (5%). Nineteen industries were surveyed, including the following: manufacturing (13%), pharmaceuticals and biotechnology (9%), telecommunications (9%), government and public sector (8%), consumer goods (7%), retailing (7%), IT and technology (6%), and financial services (6%).
- A series of in-depth interviews with senior executives, listed below.
  - Ram Chandrashekar, executive vice-president of operational excellence and IT and president of Asia Pacific and Middle East region, ManpowerGroup
  - Edd Dumbill, vice-president of marketing and strategy, Silicon Valley Data Science
  - Alan Feeley, managing director of global shared services, Siemens
  - Karthik Krishnamurthy, vice-president and global business head of enterprise information management, Cognizant Technology Solutions
  - Mary Merkel, chief underwriting officer of Zurich North America
  - Greg Taffet, chief information officer, U.S. Gas & Electric

We would like to thank all interviewees and survey respondents for their time and insight. The report was written by Peter Moustakerski and edited by Sunmin Kim. Mike Kenny was responsible for the layout.

Executive summary

The tone of corporate conversations about big data continues to shift from initial excitement to expecting long-term business impact.

Over the past four years, executives have not only become better educated about the technology behind big data, but have fully embraced the relevance of data to their corporate strategy and competitive success. It could be said that most companies are experiencing their "data adolescence", increasingly rising to the challenge of executing and delivering against the promise and potential of big data.

What are the hallmarks of this current stage of evolution, and what does the path to "data adulthood" look like from here?

In February 2015, the Economist Intelligence Unit (EIU) conducted a global survey of 550 senior executives sponsored by SAS, to follow up on our 2011 and 2012 executive surveys. By comparing the results, we were able to examine the evolution of companies' views, capabilities and practices regarding big data as a corporate asset, and explore the future implications as companies continue to mature as strategic data managers.

Additionally, we conducted six in-depth interviews with leading corporate big data thought leaders and practitioners. Two of these interviews revisited specific big data–related issues these companies faced beginning in 2011.

Key highlights of the research include the following:

- **Since 2011, a significantly larger proportion of companies have come to regard and manage data as a strategic corporate asset.** The ranks of companies with well-defined data-management strategies that focus on identifying and analysing the most valuable data (referred to here as "strategic data managers") have swollen impressively since 2011. No longer indiscriminate data collectors or wasters, companies are entering a period when the initial excitement over the possibilities presented by big data gives way to the need to prioritise and develop on data initiatives with the biggest payoff. More companies have ventured further into this stage of their data evolution, and their executives are more likely to feel that they are better at making good, fact-based business use of their information.

- **Strategic data management is correlated with strong financial performance.** Our survey points to a clear correlation between managing data strategically and achieving financial success. Companies with a well-defined data strategy are much more likely to report that they financially outperform their competitors. In addition, they are more likely to be successful in executing their data initiatives and effectively applying their data and analytics to resolve real and relevant business problems.

- **Data-strategy ownership has been elevated and centralised, while engagement and demand from the business is at an all-time high.** Across industries, data strategy has been elevated and centralised to the C-level, most often with the CIO/CTO or the newly minted chief data officer (CDO) role. At the same time, senior executives across functions and business units are increasingly in the driver's seat of their data initiatives, and not just relying on IT leadership to design and execute them.

- **Data initiatives have moved from theoretical possibilities to focus on solving real and pressing business problems.** Companies approach data initiatives today with a clear focus on their purpose—putting business value first. They are much more likely to start by articulating and finding a consensus on the high-priority business problems the organisation will solve by leveraging its data assets. Financial resources available for big data initiatives remain scarce, so there is a pronounced need to prioritise which initiatives to invest in, as well as how to demonstrate the financial return on these investments.

- **Technical challenges associated with quality, quantity and security persist.** Even top performers continue to struggle with a number of technical aspects of big data. These foundational aspects of data management still drown out the more advanced, higher-value-add aspects of data management, such as governance, compliance and converting data into actionable insights.

- **The future of big data is less about volume and velocity, and more about the value that the business can extract from it.** Going forward, companies will have to shift their attention away from the "bigness" of big data and focus on its business value. Data and analytics will be increasingly applied to predict future outcomes and automate decisions and actions. Most importantly, many companies will have to continue to evolve their structure and culture to scale up successful data pilots across the entire organisation. This means becoming more comfortable with approximation, agility and experimentation, and reinventing themselves into a new kind of information-driven, data-centric business—closer to data adulthood. ■

1 You are here: the journey since 2011

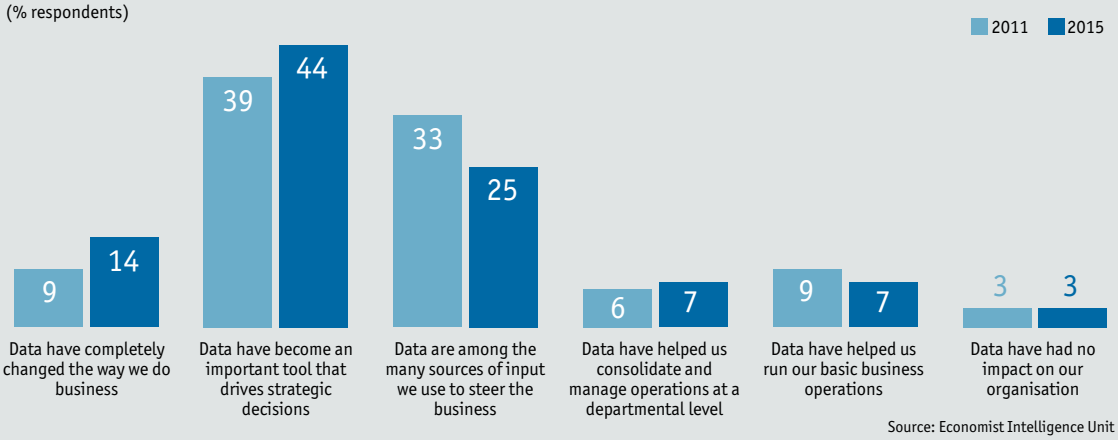
"It is going to be a game changer," said Greg Taffet, CIO of U.S. Gas & Electric, when The Economist Intelligence Unit interviewed him back in 2011. He was referring to fast-moving, real-time "big data"—which, at that time, was a novel buzz word.

Just four years ago, most executives were only beginning to see the impact these new vast pools of information, and the resulting quantitative analytics they fuel, would eventually have on their businesses. In our first comprehensive study of how companies perceive and handle big data as a corporate asset, just 9% of survey respondents said data had completely changed the way they do business, while 39% believed data had become an important tool that drives strategic decisions at their organisation. But more than half of executives saw data in less critically important terms (see Figure 1).

Today, Mr Taffet's words are widely recognised as reality, and few executives need to be convinced of the critical importance of data and analytics to the success and continued growth of their business. In our 2015 survey, 58% of respondents see data as a game-changing asset, or at least, an important decision-making tool. The ranks of executives who believe data have completely transformed their business have now grown to 14% of respondents from 9% in 2011, and those who see data as important inputs into strategic decisions now represent 44% of respondents—up from 39%.[1]

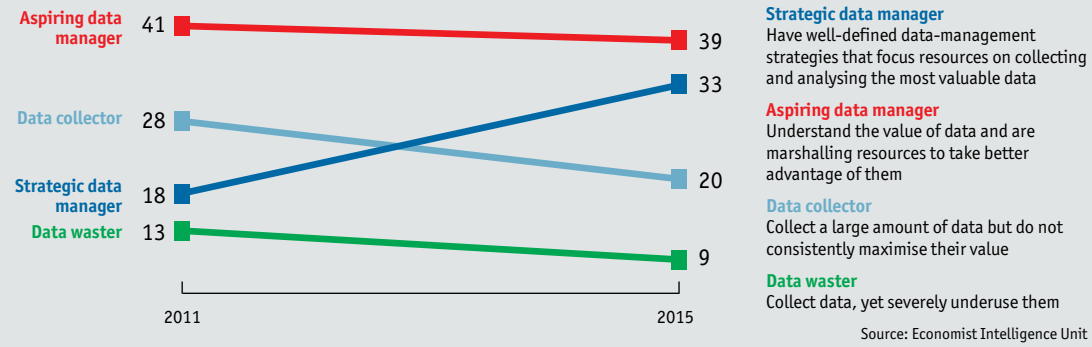
1 The 2012 survey data on these same questions reported nearly identical results as did the 2011 survey.

Figure 1
Which of the following best describes the impact data have had on your organisation over the past five years?
(% respondents)



Source: Economist Intelligence Unit

Figure 2
The prevalence of companies that are strategic data managers is on the rise.
(% respondents)



Source: Economist Intelligence Unit

Across industries, companies are entering their "data adolescence" phase, in which the initial excitement over the possibilities presented by big data gives way to the need to prioritise. As "data adolescents", what are the initiatives likely to drive the greatest value to the customer and the business?

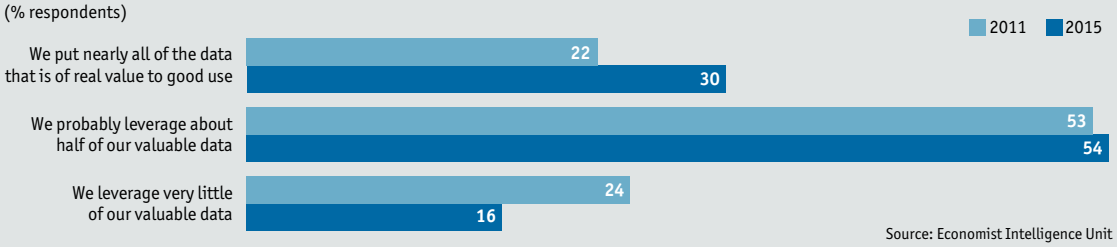
As Karthik Krishnamurthy, vice-president and global business head of enterprise information management at Cognizant Technology Solutions, an IT services firm, puts it, "On the continuum of 'strategy to adoption to maturity', most companies today are in the 'early adoption' stage." Over the past four years, they have managed to develop their data strategy, select and invest in the technology tools, even hire key talent, such as data strategists, data scientists or a chief data officer (CDO). And now, their priorities are shifting towards driving full implementation and large-scale adoption of the tools and processes, and building the right corporate culture.

In our 2011 study, we identified four categories of companies based on the level of sophistication of their thinking and strategy vis-à-vis corporate data:

- **Strategic data managers:** companies that have well-defined data-management strategies that focus resources on collecting and analysing the most valuable data;
- **Aspiring data managers:** companies that understand the value of data and are marshalling resources to take better advantage of them;
- **Data collectors:** companies that collect a large amount of data but do not consistently maximise their value; and
- **Data wasters:** companies that collect data, yet severely underuse them.

The results of our 2015 survey support Mr Krishnamurthy's assessment. They show that, in the last four years, companies have advanced

Figure 3
Which of the following statements most accurately describes your organisation's use of the data it collects?
(% respondents)



Source: Economist Intelligence Unit

The rewards of being a strategic data manager

Does it pay to approach data as a strategic asset and focus corporate resources on collecting and analysing potentially valuable data? Our quantitative research suggests so—results from our 2015 survey point to a clear correlation between being a strategic data manager and achieving financial success.

Companies that have a well-defined data strategy are much more likely to say that they financially outperform their competitors—in fact, strategic data managers are four times as much to report that they are substantially ahead of peers compared to data collectors and wasters (see Figure 4). Strategic data managers are not just better at strategy. They also seem to do much better in applying nearly all of the relevant data and analytics to real and relevant business problems (see Figure 5). Strategic data managers are much more likely than their less advanced counterparts to achieve success with their big data initiatives. In fact, 90% of them claim to be highly or moderately successful (see Figure 6). ■

Figure 4

How would you rate your organisation's financial performance in its most recent fiscal year compared with that of your competitors?

(% respondents)

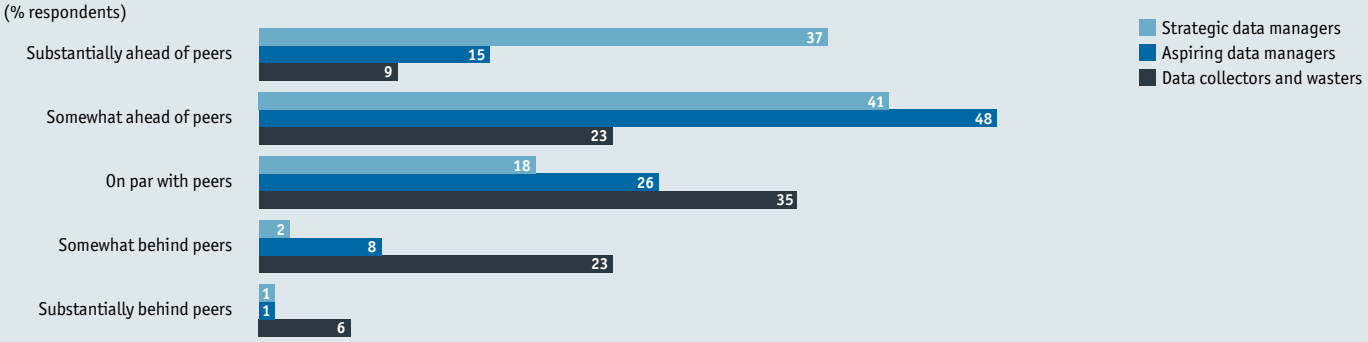


Figure 5

Which of the following statements most accurately describes your organisation's use of the data?

(% respondents)

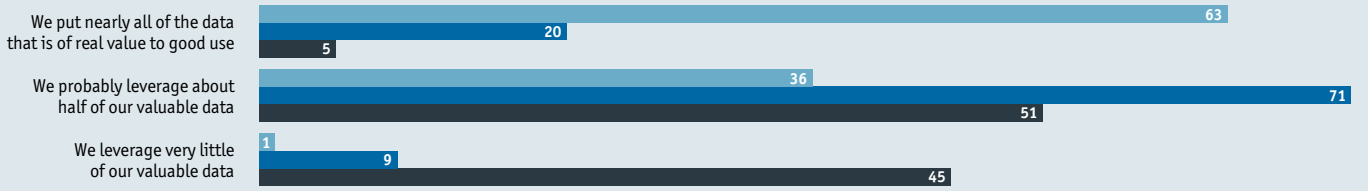
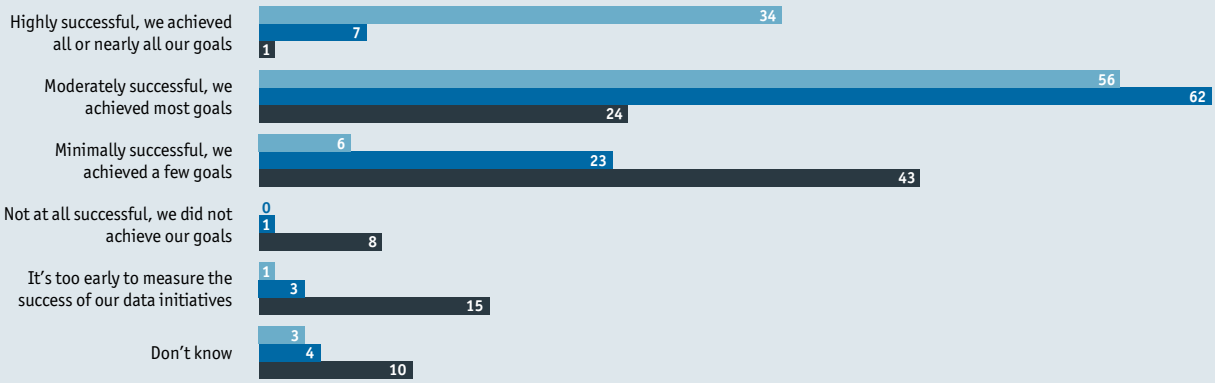


Figure 6

Thinking about your organisation's big data initiatives in the past year, please rate their overall success.

(% respondents)



Due to rounding, not all of the percentage points may add up to 100%. Source: Economist Intelligence Unit

along the evolutionary curve and, compared with 2011, many more now have developed a well-defined data strategy (see Figure 2). The ranks of strategic data managers have swollen impressively, and actually showed the only growth among our four categories, while the number of data collectors and wasters is shrinking.

Further evidence that companies are moving beyond strategy development and are tackling the adoption, or implementation, stage of data evolution is the fact that executives today put more of their valuable data to good use (see Figure 3).

"Data and analytics are no longer opportunistic," points out Alan Feeley, managing director of global shared services at Siemens, a global engineering firm. "They are now formal research areas for our company." ■

2 Ushering in the current stage: data adolescence

While more companies today have developed a well-defined corporate data strategy, therefore classifying themselves as a strategic data manager, most companies are still in the early stages of implementing and adopting one. However, they have made notable progress in the past four years. Most importantly, there is now widespread recognition of the criticality of data to the future success of the business. As a result, data strategy has become a top corporate priority and has rightfully earned a seat in the C-suite. "Appreciation for the impact of data and technology is at an all-time high among business owners today," says Mr Krishnamurthy of Cognizant Technology Solutions.

At the same time, the term "big data" no longer sounds as foreboding or mysterious as it did four years ago. Senior business executives, as well as rank-and-file managers and employees, are now savvy users of smartphones and apps, experiencing first-hand the power of combining a wide array of data sources with analytical capabilities and a user-friendly application interface. New technologies, such as mobile and cloud, have transformed their daily lives, and they can easily envision how the same can, and will, happen in their business.

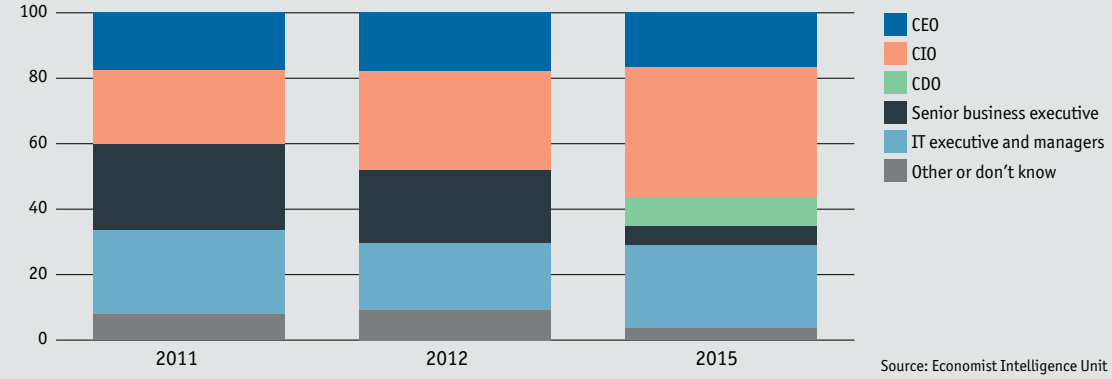
Thus, there are two clear hallmarks of the "data adolescence" stage, in which most companies find themselves today: an elevated stature and *ownership* of data strategy, and a very strong focus on the *relevance* of data and analytics and how those translate into tangible and measurable business results.

Ownership: top-down support

The ownership of data strategy and the sponsorship of data initiatives have evolved throughout the organisation. Responsibility for the organisation's data strategy has been elevated and centralised to the C-level, but at the same time, the pull and energy are increasingly coming from the lower levels of the corporate pyramid. Over half of companies surveyed make sure that data are available to employees who need them, and offer the appropriate technology and training programmes. Data strategy has become "everybody's business"—senior executives across functions and business units are increasingly in the driver's seat of their data initiatives, instead of relying on the CIO or CTO to design and execute them in a top-down manner.

The vertical migration to centralised leadership of data strategy and strong ownership from the C-suite is an emerging best practice today. "Clearly, a top-down data strategy driven and articulated by the CEO is a critical success factor," says Ram Chandrashekar, executive vice-president of operational excellence and IT and president of Asia Pacific and Middle East region at ManpowerGroup, a global human-resources consulting company. Survey data support his observation.

Figure 7
Who is primarily responsible for your organisation's data strategy?
(% respondents)



Source: Economist Intelligence Unit

Over the past four years, ownership of corporate data strategy has migrated upwards from executives at the business-unit level to C-suite members—particularly, the CIO. In 2011, 23% of respondents said their CIO is primarily responsible for all data initiatives. This proportion jumped to 30% in 2012, and continued to rise to 39% in 2015 (Figure 7).

A recent appearance in our 2015 survey is the increasingly popular chief data officer (CDO) role. This C-level position was virtually unknown in 2011—limited mostly to government and heavily

IT and the business: a happier marriage

Today, CIOs and their IT organisations are less likely to face scepticism from the business about the validity of quantitative data and analyses. Instead, as evidenced by several trends discussed throughout the paper, compared with 2011, the business is much more involved and interested in defining and executing data initiatives. "Today, support from the business is strong. The business is asking for data and analytics—they have too much to do and can't do everything in spreadsheets," says Mr Taffet of U.S. Gas & Electric.

"[Businesses] have gone from worrying about things like data quality to asking 'what other data can we harness?'," points out Mary Merkel, chief underwriting officer of Zurich North America. Today, more often than not, the business is driving demand for new data and applications. "Senior-level heads of business now understand the objectives of big data initiatives, they know the technology much better, and readily get into the 'how'," adds Mr Krishnamurthy of Cognizant Technology Solutions.

As a result, a new kind of partnership has emerged between IT and the business—what Mr Krishnamurthy refers to as "integrated leadership", an approach whereby IT and the business come together to prioritise, design and execute data initiatives. Not only is this resulting in less dead-weight friction about the goals and approach to data initiatives, but it is also allowing IT to up their game when it comes to how data tools and workflows are designed.

"We now increasingly see engineers study what staff actually do, what is their process, and ask themselves 'should the software workflow be doing what they are already doing?'," says Mr Feeley of Siemens. Such "behaviourally driven design", as Mr Krishnamurthy calls it, is emerging as a best practice in IT and data analytics, and a manifestation of the new dynamic between IT and business units, whereby software is increasingly moulded around the existing culture, processes and behaviours of users, thus achieving much faster and broader adoption. ■

ManpowerGroup: a quest for knowledge sharing

In 2011, we interviewed Denis Edwards, then-current CIO of ManpowerGroup, on how his company was managing the challenge of gathering, harmonising and disseminating data and knowledge. At the time, with data being a cross-team resource, his biggest challenge was to effectively engage various constituencies and help internal groups with different priorities and agendas share the distilled knowledge.

In 2015, we spoke with Ram Chandrashekhar, executive vice-president of operational excellence and IT and president of Asia Pacific and Middle East region at ManpowerGroup, to find out how the company's data strategy had evolved over the past four years. The progress the company has made is impressive. Compared with 2011, Mr Chandrashekhar indicated, access to data is much easier and faster across the company, data tools are standardised and integrated into the cloud, and a culture of rapid learning and improvement has taken root throughout business units.

The most visible and impactful achievement, however, has been the establishment of a global standard process for connecting operational data with financial results, combined with an outside-in view, and embedding these metrics in a uniform Monthly Management Report (MMR) that has the same format globally and is reliably produced on the same day each month. "It is the only report we look at globally, and it has created a culture of continuous dialogue, learning and engagement with the data," says Mr Chandrashekhar.

The MMRs have been integrated into a global collaboration platform, which is now available to all of ManpowerGroup's employees—more than 26,000 of them—across all branches in 80 countries. That has become the foundation of a cloud-based global knowledge-management system—a centralised resource for the entire organisation to use. "A team in Singapore can look at sales conversion metrics in Paris, and ask themselves—and their colleagues across the globe—what they can do to achieve similar performance," boasts Mr Chandrashekar.

Where does the evolution develop from here? "In the future, data will be used to automate decisions and even formulate and execute actions based on quantitative algorithms," predicts Mr Chandrashekhar. This is a next step that is not uncommon among other companies in data adolescence (see section, **Road to data adulthood: value over volume and velocity**). ■

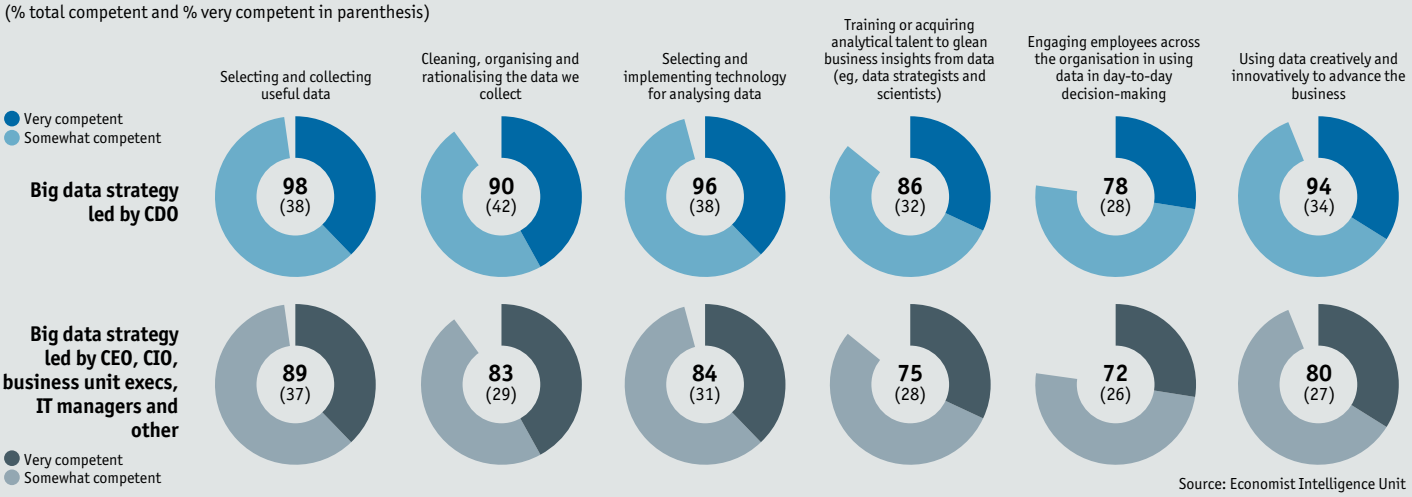
regulated industries such as banking and insurance following the 2008 financial crisis. In our 2015 survey, some 9% of respondents pointed to their CDO as the custodian of the corporate data strategy and capabilities. Emergence of this role comes at a good time, especially as business executives from across the functional spectrum have become much more technology-literate and involved in the design and execution of their data strategy and initiatives.

Paving the way for the CDO

Increased involvement from the business comes with the challenge of co-ordinating agendas, aligning priorities and communicating effectively with all stakeholders. "There is strong alignment and articulation at the C-level. People on the frontline, such as sales and operational staff, are also data-driven," says Mr Chandrashekar of ManpowerGroup. "The disconnect often happens in the middle, and the challenge is to make the data flow from top to bottom. Engaging the business is critical—data strategy cannot be seen as just a central initiative," says Mr Chandrashekar.

And few today excel at engaging the business. In our 2015 survey, when asked to rate their company's competence across different data-related corporate capabilities, respondents expressed the least confidence in their ability to engage employees across the organisation to use data in day-to-day decision-making (only 26% rated their company as "very competent", while

Figure 8
It pays to have a CDO. How competent is your organisation in the following activity areas related to big data?
(% total competent and % very competent in parenthesis)



Source: Economist Intelligence Unit

22% saw themselves as "not at all competent"). High-quality, consistent engagement across layers of the organisation and among horizontal functional lines is in high demand, and in short supply.

Enter the CDO. "The CDO has emerged as the embodiment of 'integrated leadership'," says Mr Krishnamurthy of Cognizant Technology Solutions. He points out that the best-designed CDO roles are focused on three top-level priorities: ensuring availability and integrity of data across the organisation; driving adoption—from small-scale pilots to company-wide rollouts; and driving the monetisation of new data capabilities.

U.S. Gas & Electric: a grateful deceleration

In 2011, Greg Taffet, CIO of U.S. Gas & Electric, a major energy supplier for both commercial and residential customers in the US, was getting ready for a deluge of data to start streaming in from smart-energy metres. It was anticipated as both a great business opportunity and a challenge involving significant operational effort and financial investment.

"This transformation is going much more slowly than expected," said Mr Taffet when we spoke with him in early 2015, "and happily so." Smart metres are still where the industry is going, but for now, their high cost has slowed down their broad-based rollout. In addition, while the opportunities promised by vast amounts of real-time data coming from smart metres are still there, there are other more pressing business problems that big data can help address.

"We operate in a fast-changing industry, and constantly shifting regulations are a challenge," says Mr Taffet, "so leveraging our data to help us stay in compliance is a top-priority goal." Another major objective Mr Taffet aims to achieve by leveraging data is to serve the company's customers better. "There is a strong focus on analytics," he adds, "to provide our clients the information they require and to be more responsive to their needs."

Mr Taffet is still gearing up to make significant investments both in infrastructure upgrades and in developing analytical tools to achieve these major business objectives. He adds, "We are moving ahead just as aggressively, but the assets and technologies we are investing in are closely targeted at our top business goals."

Most importantly, the role is about organisational engagement, brokering between agendas and balancing priorities among big data initiatives. Thus, finding the right senior talent to fill the CDO role can be tricky, as Edd Dumbill, vice-president of marketing and strategy at Silicon Valley Data Science, a big data consulting firm, points out: "They have to know technology, they have to know the business, and they have to be a political wiz."

Goal-setting is key

A major difference between how big data initiatives are approached today compared with four years ago is the clear focus on their stated purpose—and therefore, value. There are two concurrent dynamics driving this change. On the one hand, both business leaders and data scientists are shifting their thinking from theoretical possibilities to practical business needs. On the other, financial resources that can be deployed to big data initiatives are still scarce for most companies, so the imperative to prioritise investments and demonstrate the return are all too common realities.

As companies mature into the current data adolescence phase, the thinking and conversation among executives have shifted from pure science and the potential applications of big data, to the select, and very specific, business problems that can have a significant bottom-line impact. Most commonly, and as a matter of best practice, data initiatives are geared towards solving real customer problems: how to fulfil unmet customer needs and develop new ways to serve customers better in order to gain a sustainable competitive advantage.

"It is about 'business value discovery' or 'what can't we do now that we should be able to do for our customers and that would differentiate us?'," says Mr Krishnamurthy. "Data strategy is not about all the things that you can, or even *want to do*, it's about what you *wish to accomplish*."

The importance of focusing on the highest-impact business problems, combined with the scarcity of funding for IT and data initiatives, has put the step of prioritising at the forefront of the big data discourse within corporations. "Today, prioritising has become very important. Business executives start by asking 'what are the key business problems to solve'," says Mary Merkel of Zurich Insurance. The need to prioritise and focus on the business results has been further elevated because of the broader interest and involvement in big data and analytics coming from all corners, and levels, of the organisation.

"You have to start with a well-defined business use case," says Mr Dumbill of Silicon Valley Data Science. "You need to define the roadmap and have a business use case within at most one year. Ideally, you would be delivering business value within three to six months," adds Mr Krishnamurthy.

Our survey data support the wisdom of this approach—respondents from companies that reportedly outperformed their competitors are twice as likely to approach data and analytics initiatives by first stating the business problem and *then* mining the data for useful insights (29% vs 14% among respondents that underperform their peers). ■

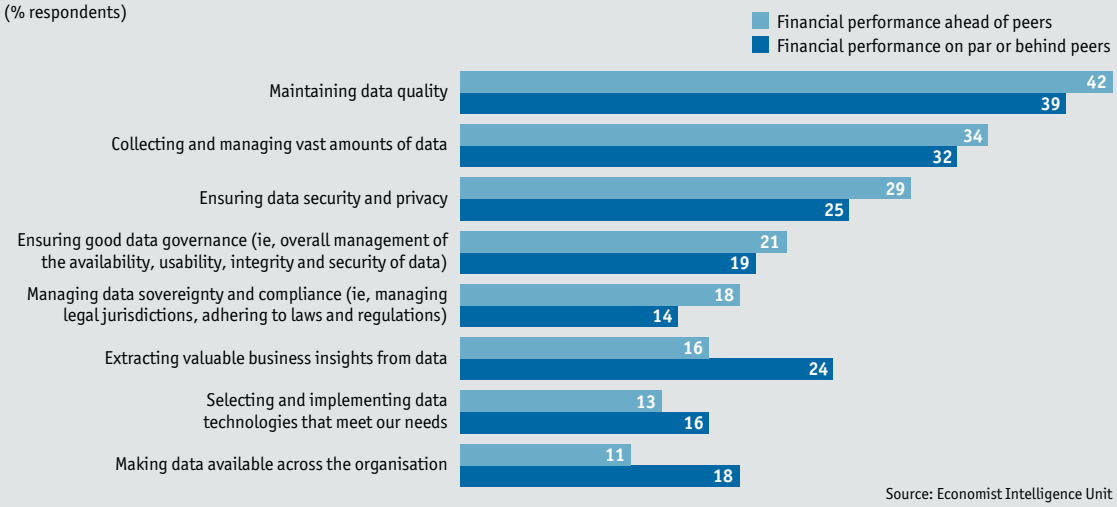
3 Foundational and talent challenges persist

Companies have made great strides in embracing data as a strategic asset, making the necessary technology investments, and even beginning to evolve their corporate structure. Centralised leadership allows for better co-ordination in strategy and execution of initiatives. And executives, both on the business side and in IT, are much more focused on deploying their limited resources on top-priority data projects that extract tangible business value from these investments.

However, significant challenges still plague most companies—and that's true even for companies with the financial resources. The most daunting challenges companies face relate to three highly technical and operational aspects of big data—quality, quantity and security (see Figure 8). These are fundamental aspects of data management. Yet companies are far from having resolved them completely and with full confidence, leading to a lack of progress to more advanced, value-added aspects of data management.

In the last four years, the problems posed by the overwhelming amount of data companies can access and collect have only been exacerbated further. In 2011, one in eight companies said they had so much data that they struggled to make sense of them—in 2015 this was nearly one in four companies. And today, more than half of

Figure 9
What are your company's most significant challenges related to big data initiatives?
(% respondents)



Source: Economist Intelligence Unit

executives (54%) say they probably leverage only half of their valuable data (Figure 3).

Given the sheer volumes, ensuring the integrity and quality of data, and arriving at the proverbial "single source of truth", are still major problems. And thus, the ultimate challenge of extracting meaningful and actionable business knowledge from data is still a significant one for most companies, even slightly more so for companies that say that they are strong financial performers as they may be more ambitious with their data strategy. But only 16% of companies these cite extracting business insights as a top challenge—for reported poor financial performers, this was 24%. Despite strong or poor financial performance, 33% of all survey respondents continue to struggle with managing the vast amount of data and 41% struggle with maintaining quality (Figure 9).

On the organisational front, companies have made strides in both creating the right structures and roles, as well as recruiting key talent to enable them to formulate and begin executing their data strategy. However, the talent market in the data and analytics field is still very tight.

This is especially still true in the market for data strategists—executives who are expected to speak the languages of both technology and data science, as well as understand the business, the markets and the customers (see section **Paving the way for the CDO**). These rare and invaluable executives—the "effective engagers", as Ms Merkel of Zurich Insurance calls them—are in short supply and high demand. As Mr Feeley of Siemens puts it, "There's a war for talent, particularly for people who combine data expertise with domain knowledge." ■

4 Road to data adulthood: value over volume and velocity

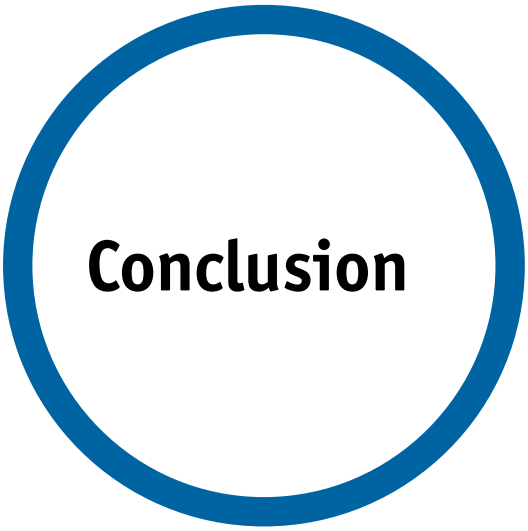
The evolution companies have undergone throughout their journey to data adolescence has been both necessary and promising. Companies are structuring their leadership teams to ensure ownership of the data strategy, and data initiatives are executed with a focus on the business goals and results they aim to achieve. Many challenges remain, especially related to managing high volumes of data, and making sense—and good business use—of them. So what does the path to "data adulthood" look like from here?

Attention will, and should, shift away from the "bigness" of big data and focus on its applicable value (see our case study on U.S. Gas & Electric). Today, many companies are overwhelmed by the volume and quantity of sources of big data and the speed with which information and new data sources are coming at them. But, "big data is not about *volume* or *velocity*, it is about *value*," as Mr Krishnamurthy of Cognizant Technology Solutions says. Mr Feeley of Siemens agrees: "We need to reduce the quantities of data and focus on the value-add, not the noise."

Data and analytics will also be increasingly deployed not just to provide transparency into the past and the present, but to predict the future in a way that drives new business growth. This will be done by converting data into knowledge, and knowledge into swift action, whether it is to serve customers better, create new efficiencies through automation, or generate incremental business by identifying cross-sell opportunities or opening new markets. "Data initiatives now are largely about cost and integration. In the future, they will be about new businesses, about monetisation of the data asset," says Mr Krishnamurthy. Signs of this are already emerging—companies that outperform their competitors are more likely to utilise big data to improve customer service (68% vs 47% of companies that perform on par or lag their peers) and to identify new markets (64% vs 43%).

Going forward, big data will be more broadly utilised to deliver predictive analytics and uncover heretofore hidden business opportunities. "We will have to truly utilise the data we have and be more predictive," says Mr Feeley of Siemens. The ability to predict future outcomes based on data and analytics will further fuel the application of big data to devise machine-learning algorithms and decision-making tools that automate and guide management judgment and actions.

Ultimately, companies will have to continue to reimagine and reinvent themselves, as their business becomes increasingly digital and their customer value proposition becomes increasingly data-driven. "Our CEO likes to say that 'Siemens is a software company'," points out Mr Feeley. Many companies are also realising that they are—or they need to become—software companies along their way to data adulthood. A big part of that evolution—and a key challenge companies will need to overcome—will be for organisations to develop a comfort with experimentation, tolerance for approximation, and short development cycles to drive faster innovation and evolution. ■



Conclusion

In the last four years, companies have matured notably in how they manage data. Most find themselves in their data adolescence phase—having formulated their big data strategy, they have embarked on the early stages of implementation. While still overwhelming in a technical sense, big data is now better understood by business leaders. They are increasingly driving the design and engaging in the execution of big data initiatives. They are also more likely to address the most critical business problems and generate the desired business results.

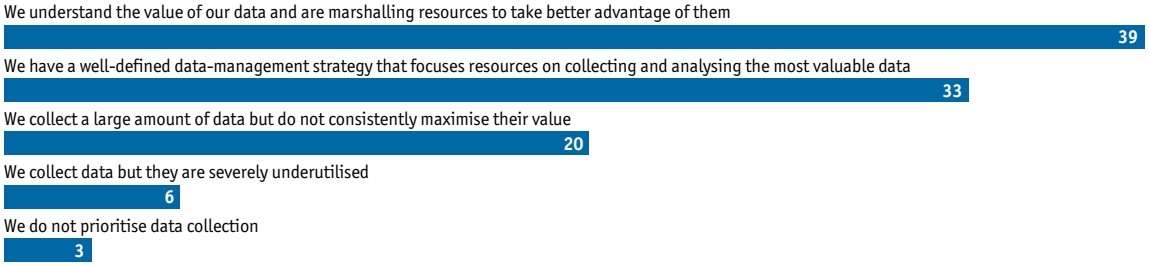
The evolution from data adolescence to data adulthood will be focused on extracting measurable value from corporate data assets and learning to rapidly scale successful data pilots into global, company-wide capabilities, rather than focusing on volume and velocity of data gathering and processing. As companies become increasingly digital and the customer value proposition increasingly data-driven, data become keystone assets to drive innovation, make forward-looking algorithmic predictions and automate decision-making.

Companies that lead the evolution will be those that put data at the centre of their strategy. They will develop requisite capabilities—including talent acquisition, employee engagement and setting the right priorities—to win the game of converting big data into lasting competitive advantage and tangible performance. ■

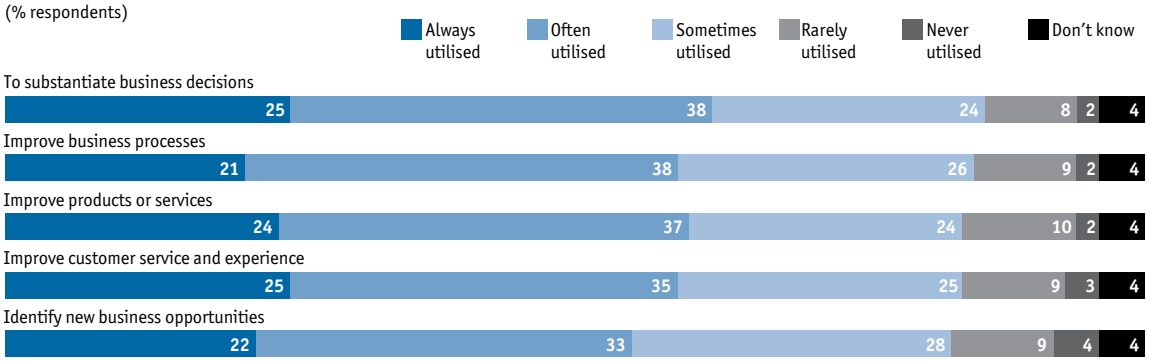
Appendix: Survey results

Percentages may not add to 100% owing to rounding or the ability of respondents to choose multiple responses.

Which of the following statements best describes your organisation's approach to data management?
Select one.
(% respondents)

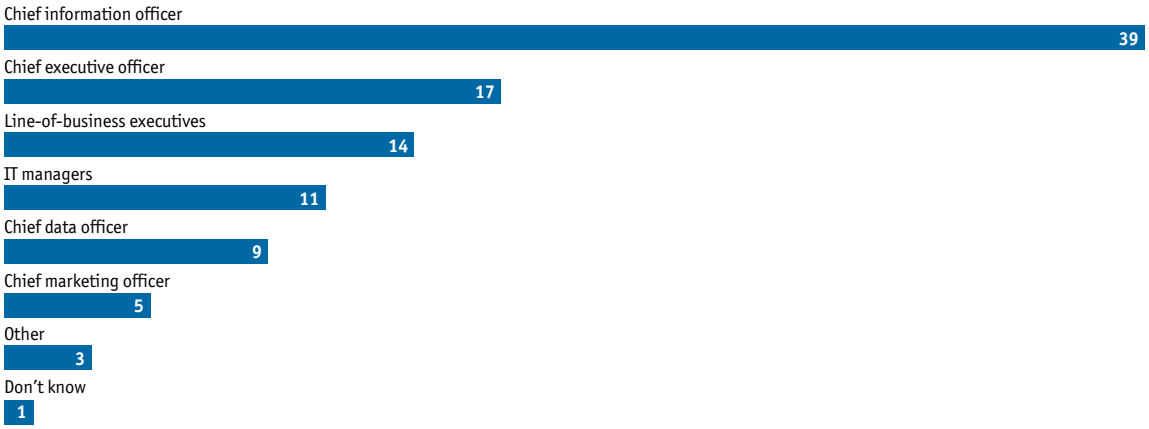


To what extent does your organisation use big data for the following purposes?
Select one in each row.
(% respondents)



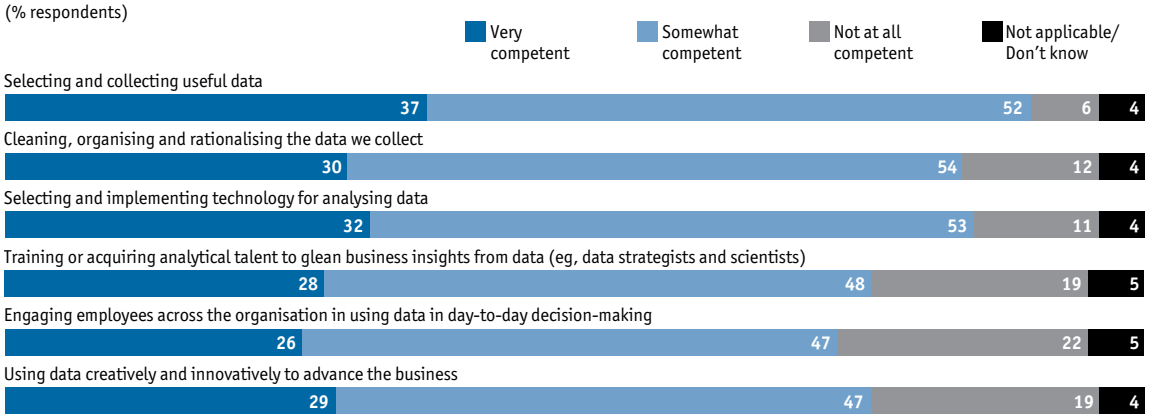
Who is primarily responsible for your organisation's data strategy?

Select one.
(% respondents)



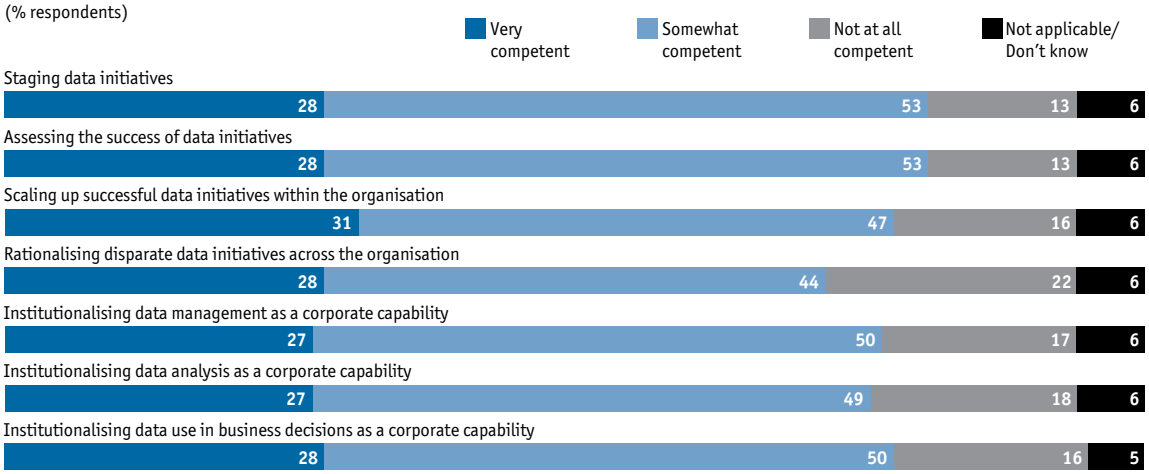
How competent is your organisation in the following activity areas related to big data *overall*?

Select one in each row.
(% respondents)

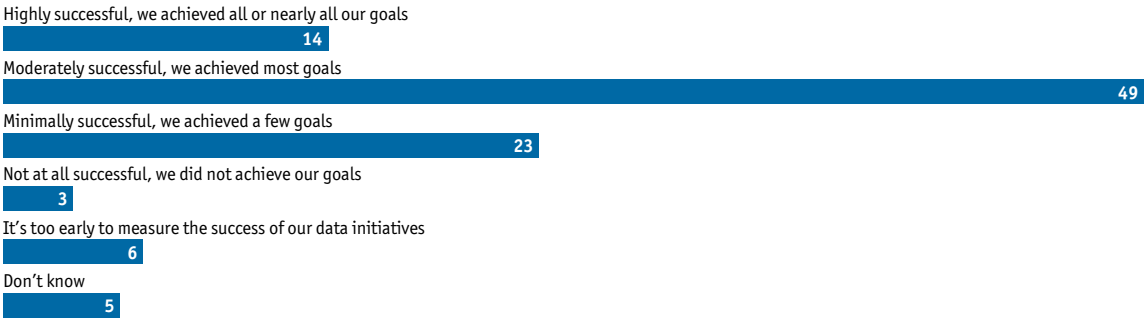


How competent is your organisation in the following activity areas related to big-data initiatives?

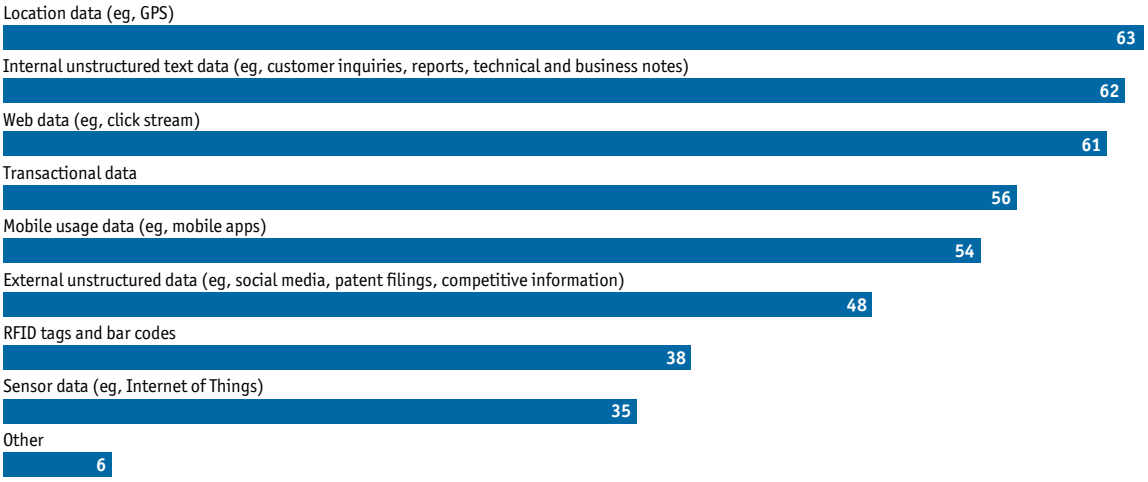
Select one in each row.
(% respondents)



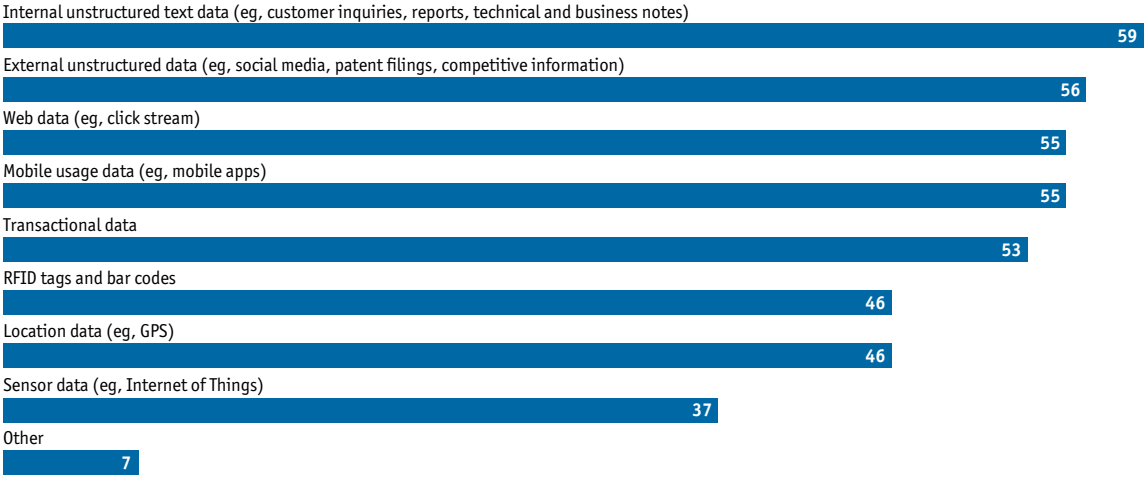
Thinking about your organisation's big-data initiatives in the past year, please rate their overall success.
Select one.
(% respondents)



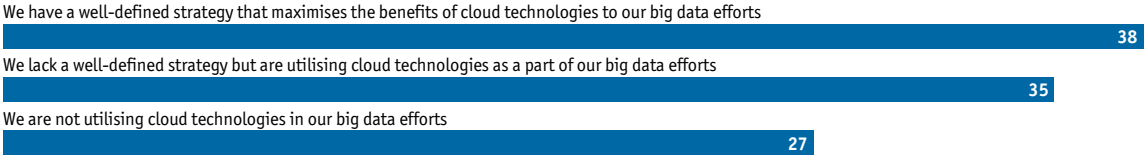
Which of the following sources of data does your organisation collect today?
Select all that apply.
(% respondents)



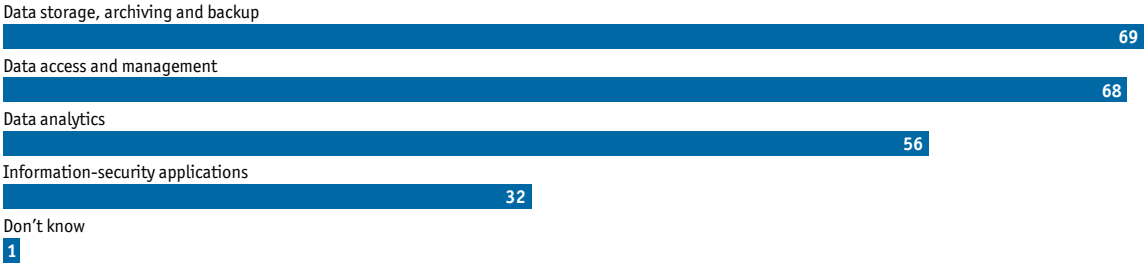
Which of the following sources of data does your organisation plan to collect in the next 12 months?
Select all that apply.
(% respondents)



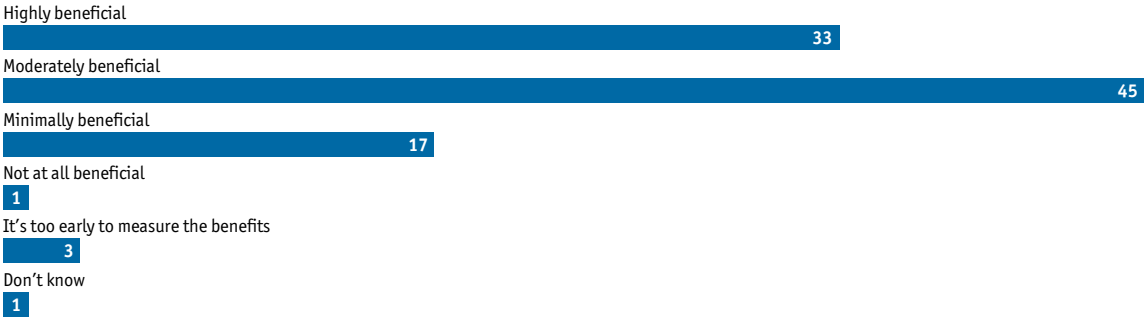
To what extent does your organisation use cloud technologies in its big-data efforts?
Cloud is defined as a model for on-demand network access to a shared pool of configurable computing resources (eg. networks, servers, storage, applications and services) that can be rolled out with minimal management effort or service provider interaction (Source: NIST, Sept. 2011).
Select one.
(% respondents)



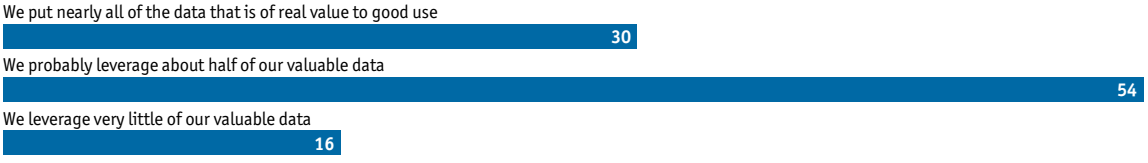
How does your organisation utilise cloud technologies in its big data efforts?
Select all that apply
(% respondents)



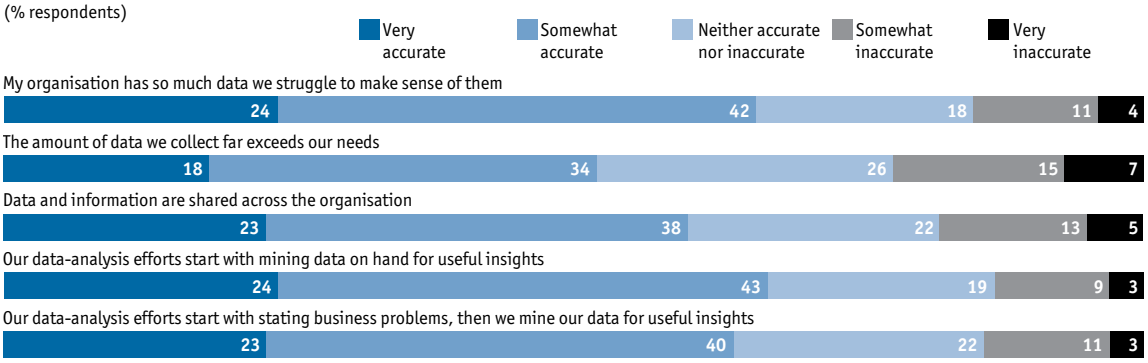
Overall, how beneficial have cloud technologies been to your organisation's big data efforts?
Select one.
(% respondents)



Which of the following statements most accurately describes your organisation's use of the data it collects?
Select one.
(% respondents)

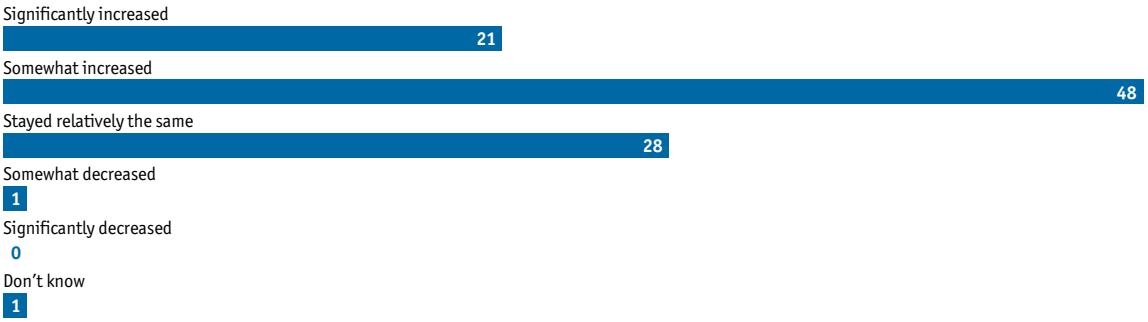


Please indicate how accurately each of the following statements describes your organisation.
Rate on a scale of 'Very accurate' to 'Very inaccurate'.
(% respondents)



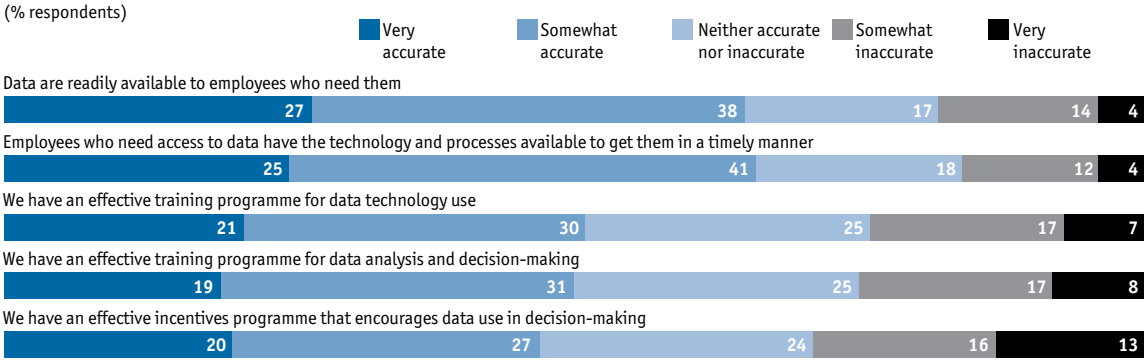
What are your company's most significant challenges related to big data initiatives?
Select two.
(% respondents)

How has the speed at which your organisation processes big data changed over the past 12 months?
Select one.
(% respondents)

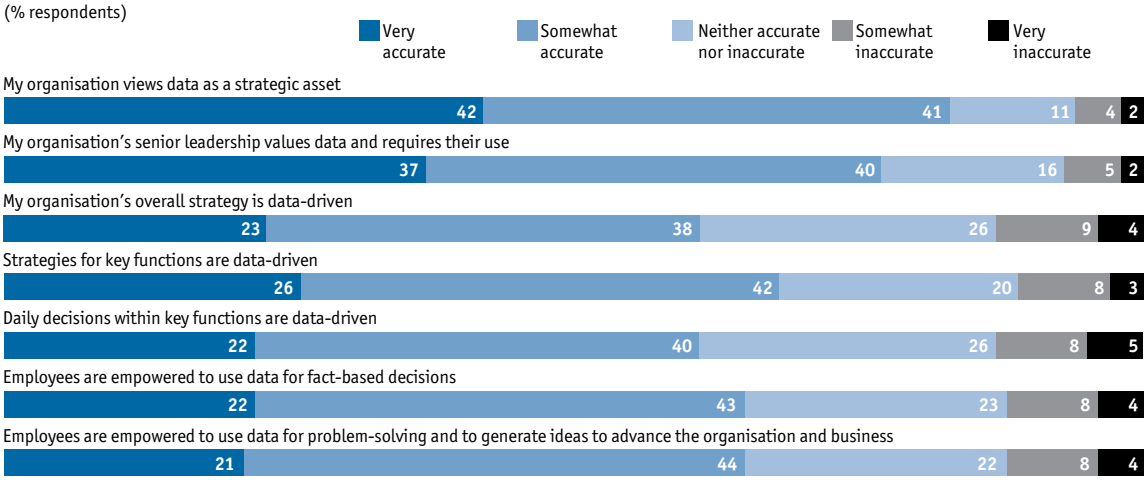


What are your company's top priorities related to talent and big data?
Select three.
(% respondents)

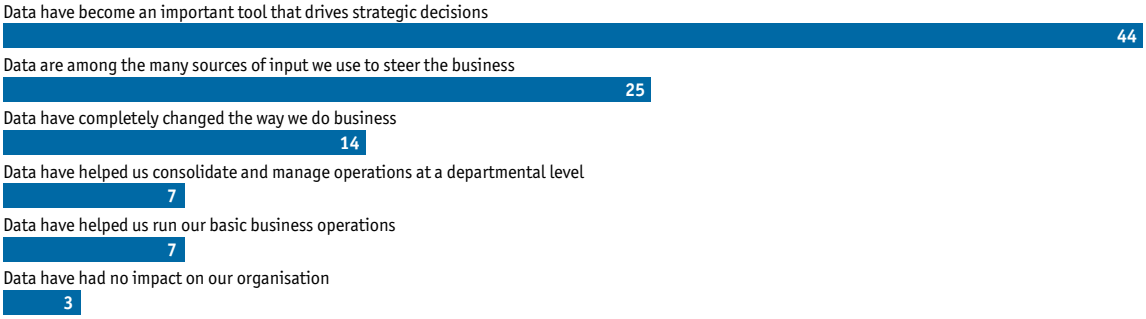
Please indicate how accurately each of the following statements describes your organisation.
Rate on a scale of 'Very accurate' to 'Very inaccurate'.
(% respondents)



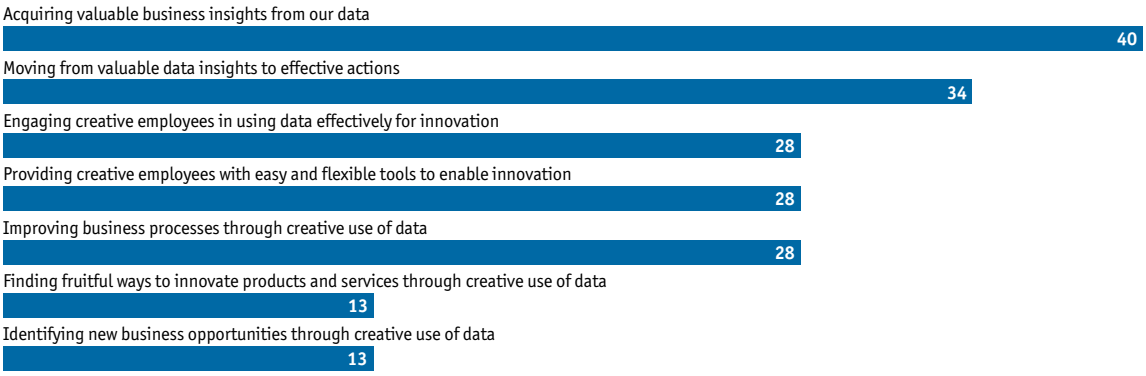
Please indicate how accurately each of the following statements describes your organisation.
Rate on a scale of 'Very accurate' to 'Very inaccurate'.
(% respondents)



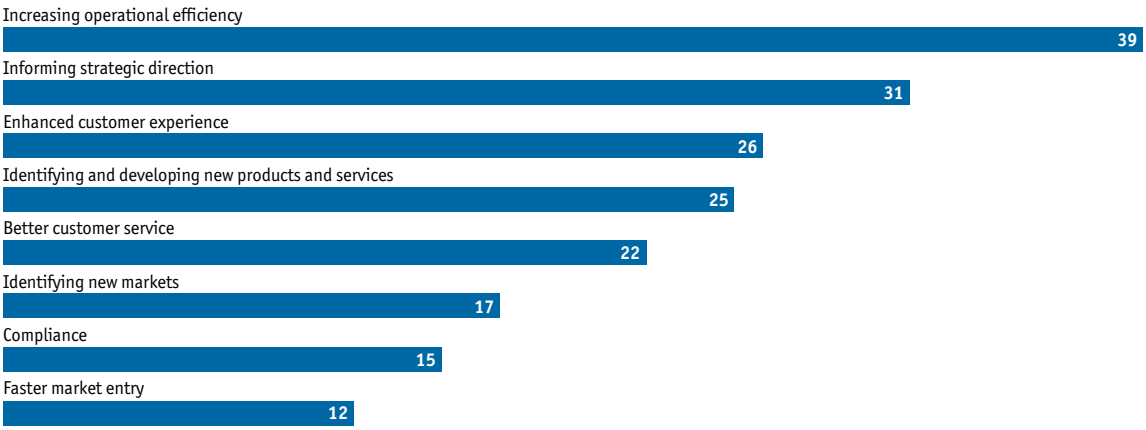
Which of the following best describes the impact data have had on your organisation over the past five years?
Select one.
(% respondents)



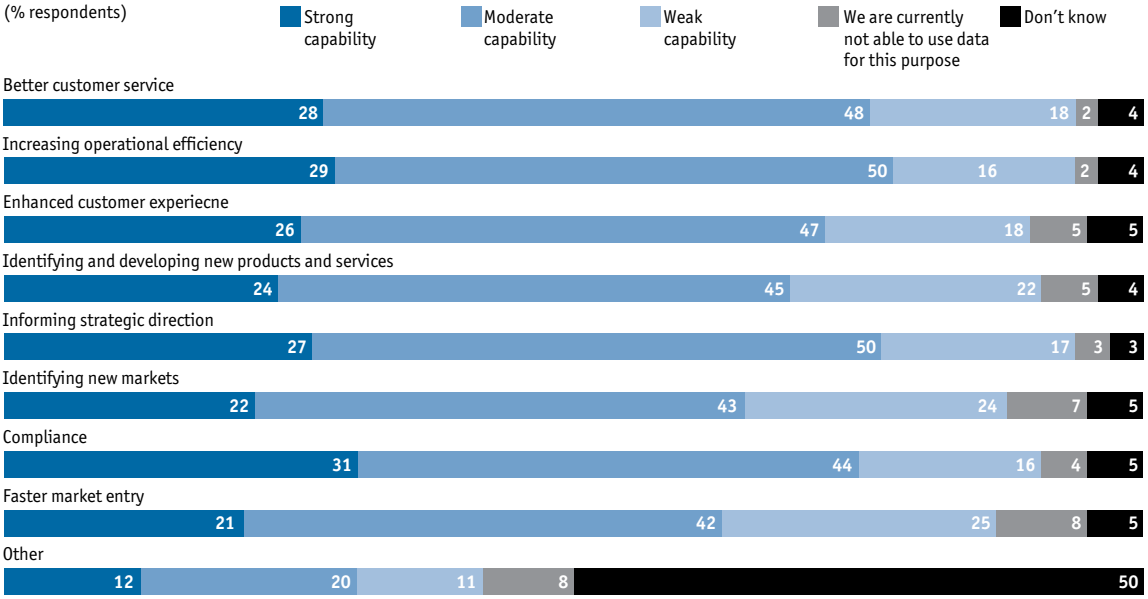
What are your company's most significant challenges related to using data for business innovation?
Select two.
(% respondents)



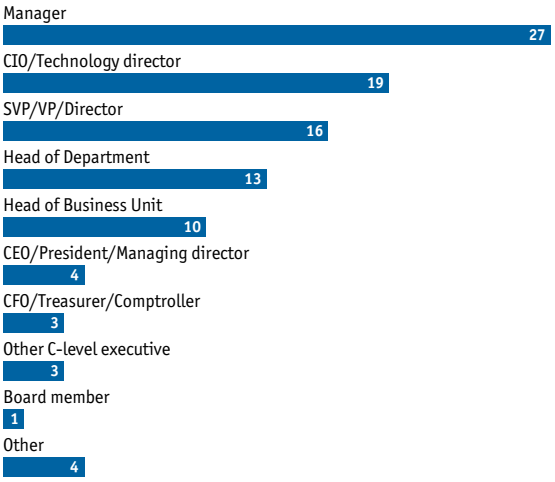
What key opportunities do you see for your organisation as the result of the availability of increased amounts of data?
Select the top two.
(% respondents)



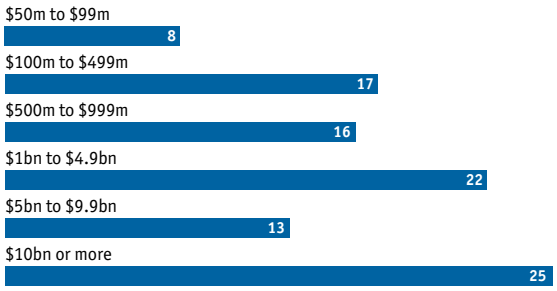
Rate your organisation's ability to use data to be creative and innovative in the pursuit of the following goals.
Select one in each row.
(% respondents)



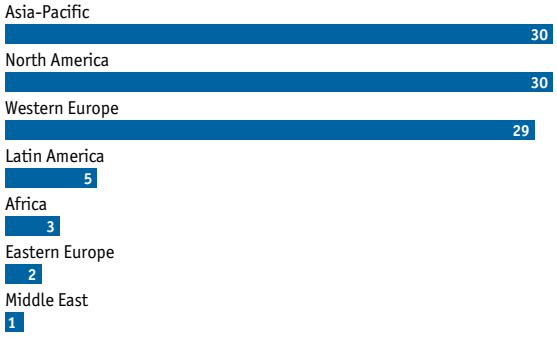
Which of the following best describes your title?
(% respondents)



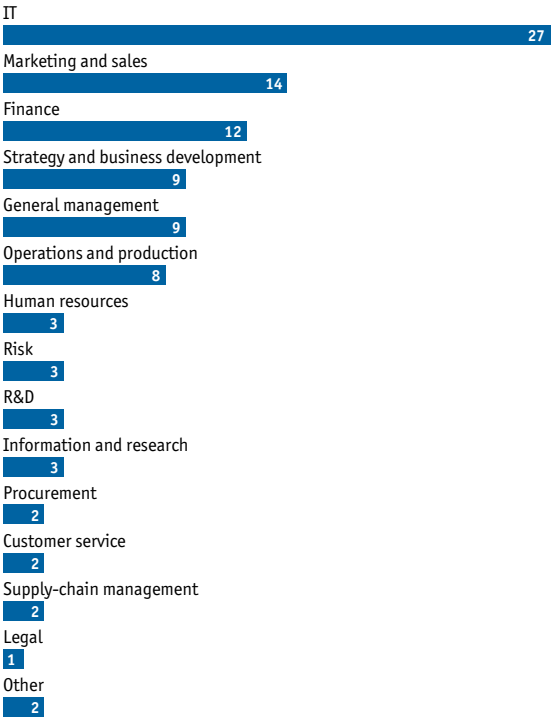
What are your organisation's global annual revenues in US dollars?
(% respondents)



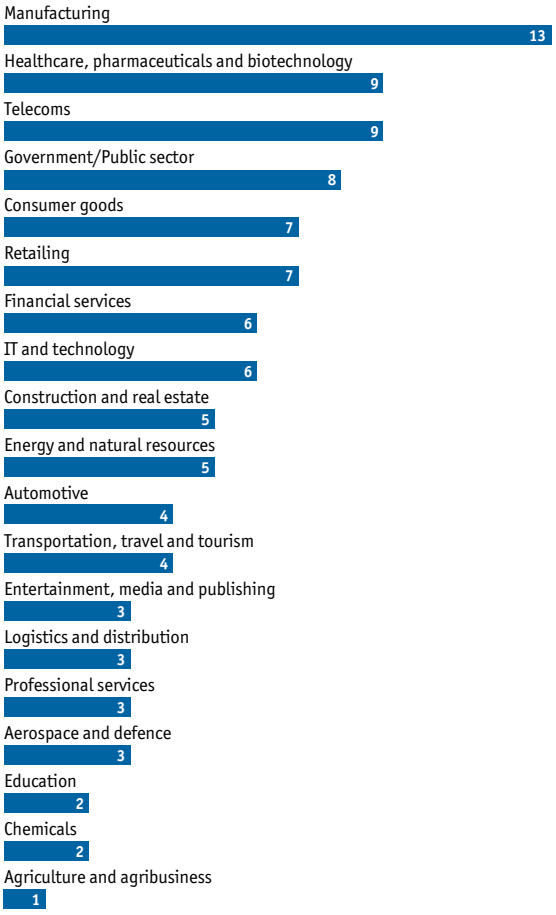
In which region are you personally located?
(% respondents)



What is your main functional role?
(% respondents)



What is your primary industry?
(% respondents)



London
20 Cabot Square
London
E14 4QW
United Kingdom
Tel: (44.20) 7576 8000
Fax: (44.20) 7576 8476
E-mail: london@eiu.com

New York
750 Third Avenue
5th Floor
New York, NY 10017
United States
Tel: (1.212) 554 0600
Fax: (1.212) 586 0248
E-mail: newyork@eiu.com

Hong Kong
1301 Cityplaza Four
12 Taikoo Wan Road
Taikoo Shing
Hong Kong
Tel: (852) 2585 3888
Fax: (852) 2802 7638
E-mail: hongkong@eiu.com

Geneva
Boulevard des
Tranchées 16
1206 Geneva
Switzerland
Tel: (41) 22 566 2470
Fax: (41) 22 346 93 47
E-mail: geneva@eiu.com

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