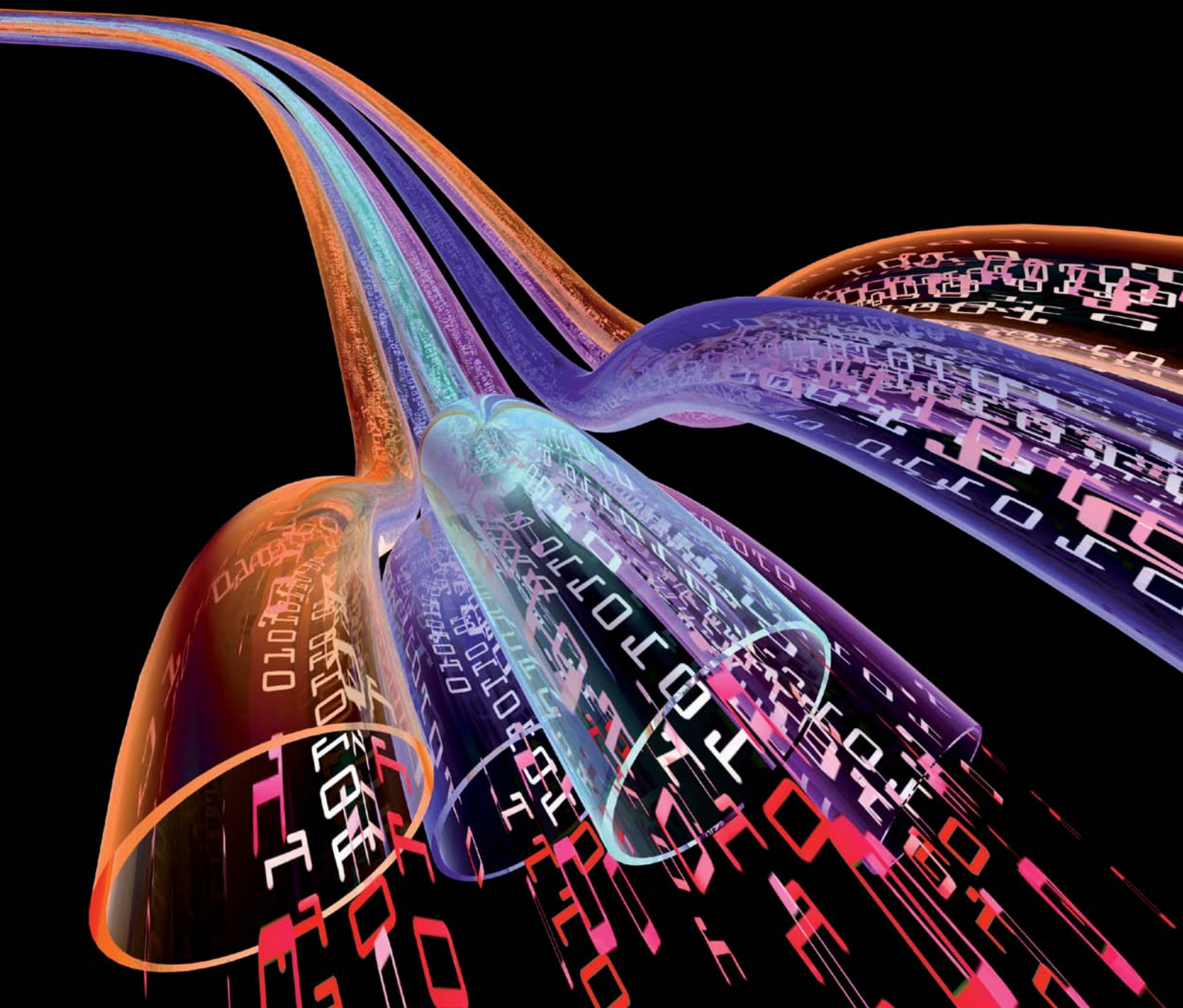
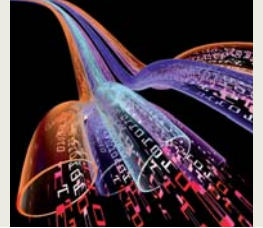


Big data Harnessing a game-changing asset

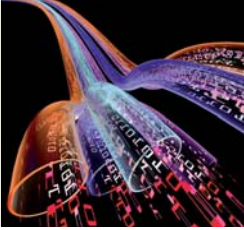
A report from the Economist Intelligence Unit
Sponsored by SAS





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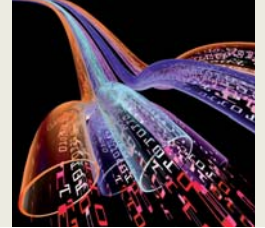
Big data

Harnessing a game-changing asset

Preface

Big data: Harnessing a game-changing asset explores the impact of big data and how companies are handling it. It also looks at the organisational characteristics of companies that are adept at extracting value from data. The Economist Intelligence Unit conducted the survey and analysis and wrote the report. The findings and views expressed in this report do not necessarily reflect the views of the sponsor. The author was Dan Briody. Gilda Stahl edited the report, and Mike Kenny was responsible for layout. We would like to thank all of the executives who participated in the survey and interviews for their valuable time and insight.

September 2011



Interviewees

ABN AMRO

Paul Scholten
Chief Operating Officer
Retail and Private Banking Business

Cathay Pacific Airlines

Steve Tunstall
Head of Corporate Risk Management

EMC

Scott Yara
Vice-president, Products

Global Partners LP

Ken Piddington
Chief Information Officer

KPMG

Stan Lepeak
Director, Global Research
Shared Services and Outsourcing Practice

Lanco Group

Ajay Dhir
Chief Information Officer

Levi-Strauss

Wim Vriens
European Director of Business Process Improvement
and New Business Operations

ManpowerGroup

Dennis Edwards
Chief Information Officer

Mueller Water Products

Bob Keefe
Chief Information Officer

Sanofi-Aventis

Serge Gornet
Director of Vaccine Operations in
Southeast Asia

Scripps Health

Jim LaBelle
Corporate Vice-president of Quality, Medical
Management and
Physician Co-management

U.S. Gas & Electric

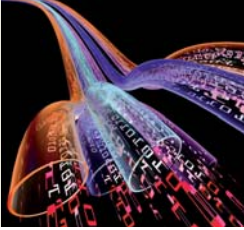
Greg Taffet
Chief Information Officer

Wharton Business School

Eric Bradlow and Peter Fader
Professors of Marketing and
Co-directors of the Wharton Business School
Customer Analytics Initiative

Duke University

David Dunson
Professor Statistical Science



Big data

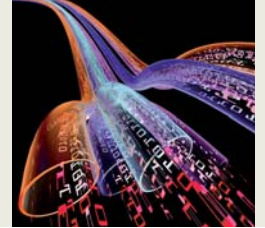
Harnessing a game-changing asset

Executive summary

The era of big data is upon us. As ever-more data pour through the networks of organisations worldwide, the race is on to extract insight and value from this abundant resource. The opportunities are enormous, as are the challenges. But companies that master the emerging discipline of big data management can reap significant rewards and separate themselves from their competitors. Indeed, research conducted by Eric Brynjolfsson, an economist at the Sloan School of Management at the Massachusetts Institute of Technology, shows that companies that use “data-directed decision-making” (defined “not only by collecting data, but also by how it is used—or not—in making crucial decisions”) enjoy a 5-6% boost in productivity.

In June 2011 the Economist Intelligence Unit conducted a global survey of 586 senior executives, sponsored by SAS, to look at the state of big data, along with the organisational characteristics of companies that are adept at extracting value from data. It also explores the most challenging aspects of data management. The research findings are as follows:

- **There is a strong link between effective data management strategy and financial performance.** Companies that use data most effectively—what we define as strategic data managers in our taxonomy of big data users—stand out from the rest. Fifty-three percent of respondents in this group say their organisations achieve higher financial performance than their peers, compared with 36% overall. The survey shows that these companies recognise the significance of data and attribute the responsibilities for data management strategy most consistently to the C-suite; 47% of survey respondents in this group report that it is set by either the CEO or another C-level business executive. These businesses understand the potential of big data and are already leveraging their data to their competitive advantage, applying them to strategy development, product direction, market development and operational efficiency.
- **Extracting value from big data remains elusive for many organisations.** For most companies today, data are abundant and readily available, but not well used. Survey results confirm this. Nearly one in four survey respondents says the vast majority of its company’s data are untapped. Another 53% say they only use about half of their valuable data. Yet 73% say that data collection in their organisation has increased over the last year. These figures indicate that organisations are still learning how to manage big data.



Big data: sorting out the skill sets

Companies surveyed by the Economist Intelligence Unit fall into four loosely defined categories of big data management (see “Stages of evolution”, page 20). Each group has specific characteristics, which we assessed by cross-referencing the responses of each group against those of the rest of the survey respondents:

Strategic data managers—companies that have

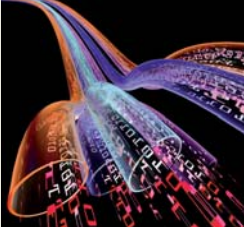
well-defined data management strategies that focus resources on collecting and analysing the most valuable data;

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 but severely underuse them.

- **Many companies struggle with the most basic aspects of data management, such as cleaning, verifying or reconciling data across the organisation.** Nearly one-third of respondents admit their data governance practices are insufficient. Many struggle to deliver important data to the right people within an acceptable timeframe. And there is also a dearth of workforce skills required to sift through, analyse and develop insights from big data. Some experts believe that big data is not yet a boon to most businesses, and that there is an urgent need for more analytical capability. “Data will not answer questions by themselves,” says Eric Bradlow, co-director of the Wharton Business School Customer Analytics Initiative.
- **Companies that are furthest along the data management competency continuum—strategic data managers—provide a useful model for how organisations will need to evolve if they are to extract and utilise valuable data-driven insights.** Strategic data managers use data to first identify specific measurements and data points that align closely with corporate strategic goals. They select the most appropriate data to make decisions, and put a high percentage of the data they collect to use. They are also more likely to assign a C-level executive to manage data strategy, and they continue to explore emerging sources of data for potential value.



Big data

Harnessing a game-changing asset

Introduction

Data have always played a critical role in business. Indeed, the recording of transactions and financial information, an early form of data management that later came to be known as accounting, is a practice that was born nearly 7,000 years ago. Since then the collection and analysis of everything from customer demographics to stock market movements have steadily evolved and been refined. For centuries companies have mined internal and external data, all in the hopes of increasing the efficiency of their operations or gaining a competitive advantage in the market.

Still, there is something different about what is happening today. The digital age has brought with it a quantum increase in the amount of data available to the modern organisation. Retail giant Wal-Mart feeds more than 1m transactions an hour into databases estimated at more than 2.5 petabytes.¹ Facebook's 750m users create an average of 90 pieces of content each month.² And an average of 294bn e-mails are sent every day.³

But it is not just the quantity of data that sets this time in history apart. The speed with which data reach organisations, the variety of their form and the insights they contain are completely changing everything we have known about the collection, analysis and management of data. These changes represent the dawn of a new era of "Big Data", an era in which the sheer volume of data, and data *about* data (or metadata), can reveal profound truths about the way the world works, about how disease is spread, about how financial crises can be avoided and, of course, about how businesses can better compete. New data are produced every day, generated by mobile phones, global positioning satellites and social networking sites. And each time new kinds of data are born, so too are opportunities to learn from them, combine them with existing data and create new insights.

About the survey

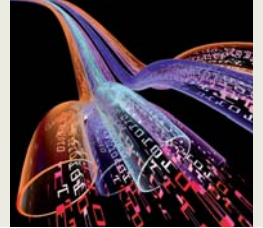
The survey, conducted in June 2011, included responses from 586 senior executives from around the world. Of those respondents, 48% are C-level executives. Thirty-one percent hail from North America, 28% from Asia-Pacific, 26% from Western Europe, 6% from Latin America, 5% from the Middle East

and Africa, and 5% from Eastern Europe. Companies with less than US\$500m in revenue comprise 48% of the responses, and 39% of the respondents come from companies with more than US\$1bn in revenue. The survey covers nearly all industries, including financial services (13%), professional services (11%), manufacturing (11%), IT and technology (10%) and healthcare (8%).

¹ <http://www.economist.com/node/15557443>

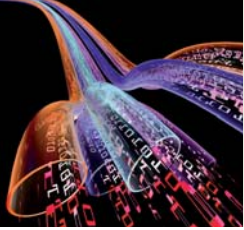
² <http://www.facebook.com/press/info.php?statistics>

³ http://email.about.com/od/emailtrivia/f/emails_per_day.htm



However, because the shifts in both the amount and potential of today's data are so epic, businesses require more than simple, incremental advances in the way they manage information. Strategically, operationally and culturally, companies need to reconsider their entire approach to data management, and make important decisions about which data they choose to use, and how they choose to use them. Economist Intelligence Unit research indicates that most businesses have made slow progress in extracting value from big data. And some companies attempt to use traditional data management practices on big data, only to learn that the old rules no longer apply.

One of the most startling realisations, however, is that the era of big data has only just begun. The amount of data produced continues to accelerate, even as businesses large and small struggle to update their practices. There is still much to learn. But for those companies that combine a long view with advanced data management practices and cultural change, there is an opportunity to put some distance between them and their competition.



Data matter

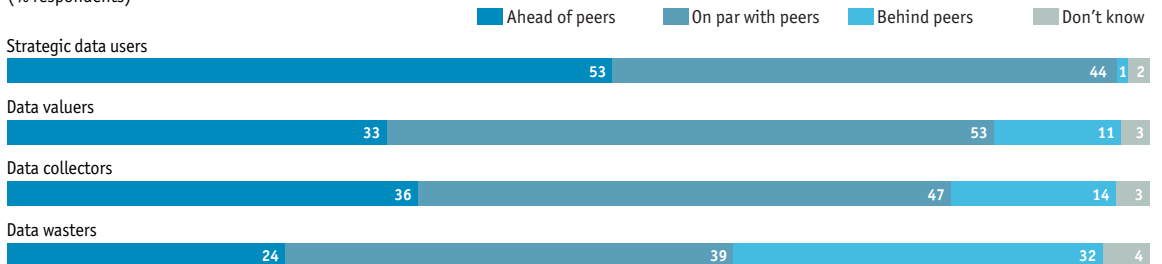
For those who work with data every day, the case for their importance does not need to be made. But for many professions, in many industries, the relationship between data and profit is not yet evident. Much like the long-running debate over the relationship between information technology (IT) and productivity, there are those who question whether good data, ably analysed and judiciously applied, result in higher corporate performance. Some business executives will argue that human intuition and work experience trump data in supporting business decisions.

“We have some guys that have been in the business for 40 years, and they rely less on the technology and the data,” says Ken Piddington, chief information officer (CIO) at Global Partners LP, a US\$8bn wholesale distributor of gasoline and heating oil in the north-eastern US. “There is still a lot of human interaction in this business, and the good old boys have a different way of doing things.”

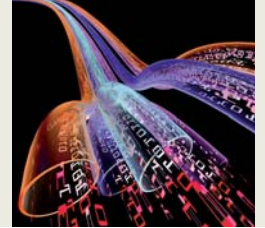
Still, the case for doubting the usefulness of data is becoming harder to make. “Strategic data managers”—those companies surveyed by the Economist Intelligence Unit that identified themselves as having a well-defined data management strategy that focuses resources on collecting and analysing the most valuable data—are far more likely to outperform their competition financially than “data collectors” or “data wasters” (see “Stages of evolution”, page 20). In fact, 53% of these strategic data managers say that they outperformed their peers in the last fiscal year, 44% say they are on even par and only 1% said they lagged. Meanwhile, only 24% of data wasters outperformed their peers and 32% lagged.

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

(% respondents)



Source: Economist Intelligence Unit survey.



Global Partners LP: from data to dollars

Some businesses depend on big data more than others. Global Partners LP, a US\$8bn wholesale distributor of gasoline and heating oil in the north-eastern US, has capacity to store more than 10m barrels of oil. Its customers include heating oil providers, gas stations, municipal agencies and utility companies. The company's prices change at least once a day, based on inventory levels, weather patterns, global market speculation, demand and competitor prices. And Global Partners works on margins of pennies per gallon.

"This market is so volatile, we have to be monitoring the data in near real time," says the company's CIO, Ken Piddington. "It is all about setting our prices right to optimise profit margins. If we come in too low, customers will pull more product than we have. If we are too expensive, we will end up with too much product in a particular location. And the prices we set are based on the data we are getting. So if the data are bad, we are losing money."

Adding to that pressure, Global Partners' customers have access to much of the same data, can view prices from every wholesaler in a given region and instantly assess their credit lines with each. "That means our pencil has to be that much sharper," says Mr Piddington.

To ensure the most accurate and timely data possible, Mr Piddington had to first achieve a single version of the truth. With different analysts pulling information from different sources, there were too much data open to subjective interpretation, leading to costly disagreements. So Mr Piddington worked to reconcile the market data, developing a common master data warehouse from which all data were distributed to analysts.

"I had to first demonstrate to management how having multiple versions of this information was costing us money," says Mr Piddington. He showed his bosses how on one day in particular, the conflicting data cost the company tens of thousands of dollars in missed opportunity. "After that we reviewed all of the business processes associated with these specific data, designed new processes, reduced headcount and started moving data entry clerks into analysis roles. So just the act of reconciling the data saved us money," he says.

The biggest challenge that Mr Piddington faces today is more cultural than technical. While he has focused largely on delivering quality data on time, he still confronts significant resistance from those he is trying to support. "Making it more useable is a challenge," he says. "But there is a cultural piece to all of this as well. And I am trying to help some people within the organisation understand that the data can help them make better decisions."

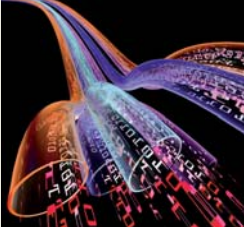
These financial comparisons are, of course, self-reported. And it is difficult to determine whether better-run companies tend to have good data management practices, or whether good data management practices lead to better-run companies. But there is a growing body of evidence that points to data-driven decisions leading to financial success. Eric Brynjolfsson, an economist at the Sloan School of Management at the Massachusetts Institute of Technology, found that companies that adopted data-driven decision-making achieved productivity boosts of 5-6%.⁴

"We think the best companies are generating, collecting and using data to change their organisations," says Scott Yara, vice-president of products at EMC, an information infrastructure and services provider. Mr Yara thinks the era of big data is just getting started and will have major implications on how business is done worldwide. "Most companies can feel that something exciting is happening here, and they are still trying to figure out how it is different from what they have been doing. But the best companies are already able to operationalise data, and are letting it pervade the organisation."

It is not unreasonable to think that the gap between companies that are still trying to understand the implications of big data and those that are allowing it to transform their businesses accounts for the differences in financial performance mentioned above. All of which makes big data a potentially critical business asset.

Hence the responsibilities for developing strategies for collecting and analysing data in many companies are rising to the level of the C-suite. Not long ago, data management strategy was handled

⁴ *Strength in Numbers: How Does Data-Driven Decisionmaking Affect Firm Performance?*, Erik Brynjolfsson et al, April 2011



Big data

Harnessing a game-changing asset

“An executive commitment is necessary if you are to have the rigour to define, capture and deploy data effectively. Bottom up may not necessarily work.”

Stan Lepeak, Director, Global Research Shared Services and Outsourcing Practice, KPMG

by mid-level IT employees, versed in relational database management systems and query languages. But today, the strategic elements of data management are more likely to be handled by the corner office than the back office.

“An executive commitment is necessary if you are to have the rigour to define, capture and deploy data effectively,” says Stan Lepeak, director of global research at KPMG’s Shared Services and Outsourcing Practice. “Bottom up may not necessarily work. If these things are left to the rank and file, it can become problematic.”

Economist Intelligence Unit research bears this out. Forty-four percent of survey respondents say that either the CEO or another senior business executive is responsible for their company’s data management strategy. Another 42% say data duties rise to the level of the CIO’s office or another senior IT executive. Only 7% of respondents say they leave these to mid-level IT managers. Indeed, the rising importance of data within the organisation is solving some long-festering alignment problems between IT departments and their business counterparts: 53% of respondents say that the increase in their organisation’s use of data has made the IT function more strategic to the business.

Who is primarily responsible for your organisation’s data management strategy?

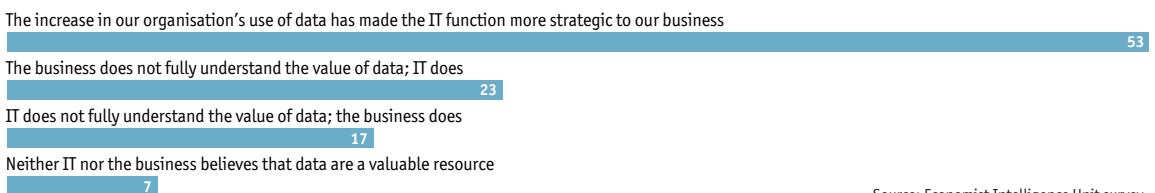
(% respondents)



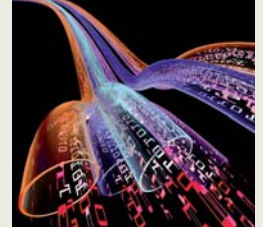
Source: Economist Intelligence Unit survey.

Which statement best describes the relationship IT has with the business with regard to data?

(% respondents)



Source: Economist Intelligence Unit survey.



Scripps Health: fostering a data-driven culture

“In healthcare, it’s not ‘big data’,” says Dr Jim LaBelle, corporate vice-president of quality, medical management and physician co-management at Scripps Health, the San Diego-based health system that includes 5 hospitals, 2,600 physicians and more than 13,000 employees. “It is a tidal wave of data. And our ability to restructure and change our culture is almost entirely informed by these data,” he says.

For the last several years, Dr LaBelle has been overseeing an effort to change the culture at Scripps, from one in which quality is measured almost entirely by the performance of physicians to one in which quality is measured by the performance of the processes, systems and teams that support them. “We don’t want our physicians to be exclusively responsible for quality,” says Dr LaBelle. “We want quality to be measured by the team. So we are looking at monitoring variation around processes and driving out waste and supporting better care by developing a management system and partnership with the medical staff.”

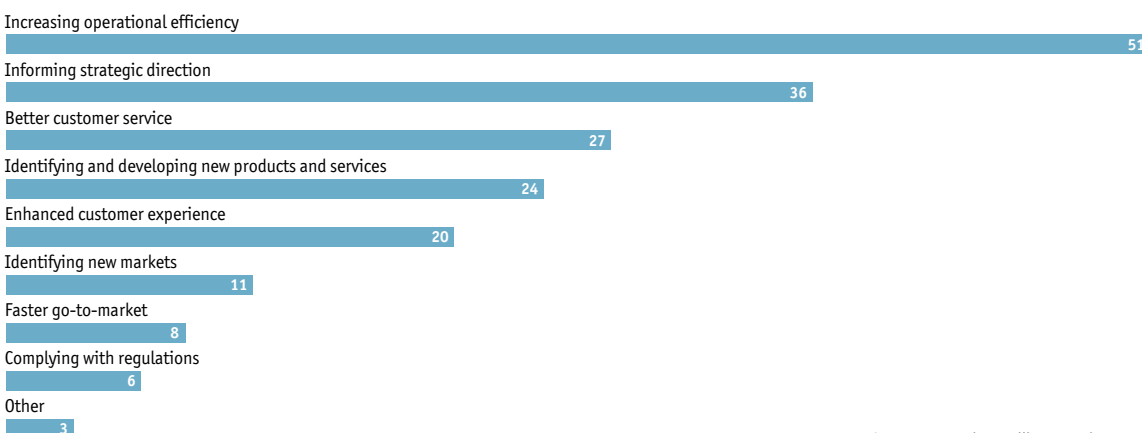
To inform its approach to these changes, Scripps collects and analyses variation data, or information about whether a particular process was in control. For example, in anticipation of re-engineering its emergency room procedures, Scripps collected and analysed massive amounts of data on wait times (such as the door-to-doctor metric), and cross-referenced the information against the type of injury, tests that were ordered and how long it took to discharge the patient. “We plotted the variability, and looked at it over time, by shift, hour of the day and against different events, to determine how that variability got in there,” says Dr LaBelle. “Then we did extensive simulation of our processes using real-life data, modelling how new and different processes might work.”

Scripps found that the triage process added an unnecessary and wasteful step in getting patients from the door to a doctor. It was adding time and cost to the system, and not adding significant value. So the company eliminated it. “We were able to reduce the critical door-to-doctor time, add capacity to our emergency rooms and improve the quality of our service,” says Dr LaBelle. “We’re building a new hospital right now, and we’re looking into whether we even need to build a waiting room in the ER.”

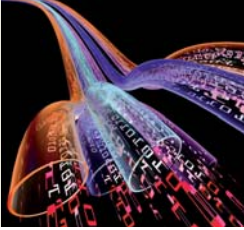
The research tells us that strategic data management is a critical factor in financial performance, and that most companies are putting top management in charge of their data management strategy. However, what do organisations hope to derive from the increased volumes of data they collect? The end-goal depends very much on the industry, the market conditions and the strategic imperatives of a given firm. Although most companies hope to achieve at least some operational efficiency benefits (51%), other responses vary considerably.

What new opportunities do you see for your organisation as the result of the availability of increased amounts of data?

Select up to two.
 (% respondents)



Source: Economist Intelligence Unit survey.



Big data

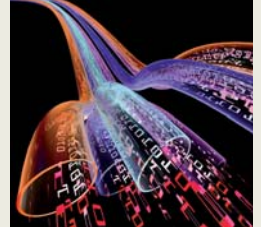
Harnessing a game-changing asset

“In healthcare, it’s not ‘big data’. It is a tidal wave of data. And our ability to restructure and change our culture is almost entirely informed by these data.”

Jim LaBelle, Corporate Vice-president of Quality, Medical Management and Physician Co-management Scripps Health

Bob Keefe, former president of the Society for Information Management and CIO for Mueller Water Products, a US\$1.3bn manufacturer of water infrastructure, used customer feedback data directly to inform a major strategic shift in his business, which led to the acquisition of Echologics, a leak detection and pipe condition assessment company. Steve Tunstall, head of corporate risk management at Cathay Pacific Airlines, uses data to develop fuel hedging strategies, assess market risk and analyse credit. And Serge Gornet, director of vaccine operations in south-east Asia for Sanofi-Aventis, a pharmaceutical company, collected data on pregnant mothers in developing countries to learn that midwives are an increasingly important distribution channel for the company’s infant vaccine products.

There are as many uses of data as there are types of data. They can inform strategy, increase efficiency, identify markets and enhance customer experiences. None of these can be accomplished, however, unless the data are clean, accurate and reliable.



Early days of big data: a land grab

About two decades ago, data were considerably harder to come by. Companies would pay data collection and survey companies for consumer demographic information. They would subscribe to Wall Street firms for economic and market trend data. And they would meticulously collect, often in spreadsheets, transactional data about their own financials and operations. In other words, companies used to spend considerable resources in identifying and procuring useful data.

Today, most companies have the inverse problem. Data are so abundant and so readily available that they have trouble keeping up. From consumer behaviour on websites to social media postings, from sensors to satellites, data have become ubiquitous and in many cases very cheap. As a result, the prevailing wisdom among most businesses is not unlike that of Western pioneers in the US during the days of manifest destiny: stake your claim, sort out the details later.

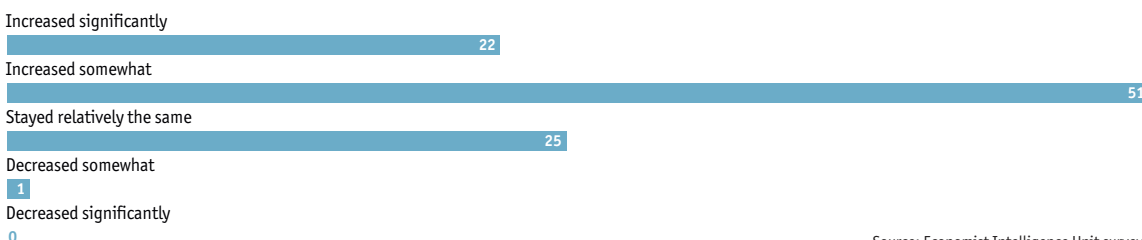
“I think there is a disconnect between the ability to collect data and the ability to base decisions on them,” says Eric Bradlow, professor of marketing at the University of Pennsylvania’s Wharton School and co-director of the Wharton Customer Analytics Initiative, an academic research centre that focuses on the development and application of customer analytic methods and data-driven business decision-making. “People need to take a deep breath. They need to be more thoughtful about it. Because the data will not answer questions by themselves.”

Yet the collection of data continues unabated. Over the last year, 73% of survey respondents say their collection of data has increased “somewhat” or “significantly”.

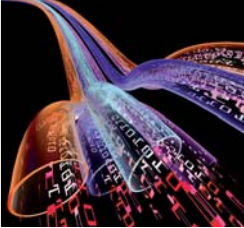
Only 1% says its collection of data has actually decreased over the last year.

Over the last 12 months, my organisation’s collection of data has...

(% respondents)



Source: Economist Intelligence Unit survey.



Big data

Harnessing a game-changing asset

The data sceptics

Peter Fader and Eric Bradlow are professors of marketing at the University of Pennsylvania's Wharton School. They are also co-directors of the Wharton Customer Analytics Initiative, an academic research centre that focuses on the development and application of customer analytic methods and data-driven business decision-making. And they are both critical of the approach businesses are currently taking to big data. The Economist Intelligence Unit conducted a joint interview with these thought leaders on the meaning of big data, and what needs to change.

Q: Is big data a boon to business?

A: Peter Fader: Not at the moment. In some ways we are going in the wrong direction. Back in the old days companies like Nielsen would put together these big syndicated reports. They would look at market share, wallet share and all that good stuff. But there used to be time to digest the information between data dumps. Companies would spend time thinking about the numbers, looking at benchmarks and making thoughtful decisions. But that idea of forecasting and diagnosing is getting lost today, because the data are coming so rapidly. In some ways we are processing the data less thoughtfully.

Eric Bradlow: There does seem to be a greater separation between the IT folks that can handle these big, real-time data sets, and the managers that want to use them. There is this massive fear of throwing away even the tiniest bits of information. You see companies saving records from 500m transactions so they can analyse what will happen if they drop their price. But they don't need to do that. All they need is a sample

set. (For an alternative viewpoint, see page 16.)

But this is part of a natural evolution. The IT data capture always comes first. Then people will figure out how to deal with these massive data sets.

Q: So what is the next step for these "data hoarders"?

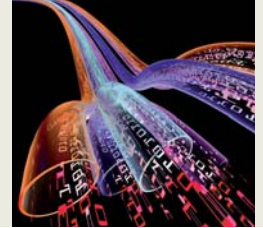
EB: I think that pretty soon the costs will be prohibitive and companies will begin to change their behaviour. Even though data warehousing is getting less expensive, they will realise that they are spending huge amounts on measurement and storage engines and the return is not what they had hoped for. I also think they need to start focusing first on what decisions they need to make, thinking about what they need to know, as opposed to what it is possible to know. If you work closely with the line of business guys, they'll tell you what they need to make good decisions.

PF: They need to make the tradeoff between volume and quality. Then they can hone in on the 3 to 12 measures they really care about and focus on collecting and analysing the patterns that emerge.

Q: What is possible today in the era of big data that was not possible before?

PF: It is the speed and granularity of the data that set this time apart. As long as you know which measures to send to which people at which time, you can actually achieve real-time interactions. And that can lead to ever-more granular data.

EB: There is a balance, however. I mean, real time is great conceptually, and hyper-targeting is great theoretically. But you cannot make an infinite variety of products. You cannot offer 10bn different services to 10bn different people. So there is a difference between what a company can know, and what it can actually do about it.

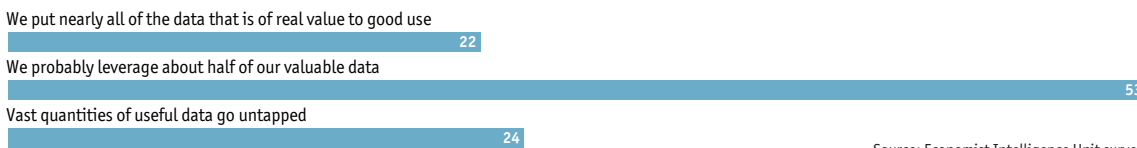


The factors that have affected data collection are quite varied. For example, 21% of survey respondents say that organisational growth has been the biggest factor in the collection of new data; 16% cite fulfilling regulatory requirements; and 10% are looking for more detailed analysis.

Regardless of these influences, however, the land grab mentality that has gripped companies in every industry is leading to some disarray and waste. Only 18% of respondents claim to have a well-defined data management strategy, and 37% either do not consistently maximise the value of their data or severely underuse them.

To get a better sense of just how much data are going unused, the Economist Intelligence Unit asked survey respondents to estimate their data efficiency. The results are surprising: 24% say that vast quantities of data go unused at their company, and 53% use only about half of the data that is of value. Only 22% of respondents say that they are putting nearly all of their data that is of real value to good use.

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

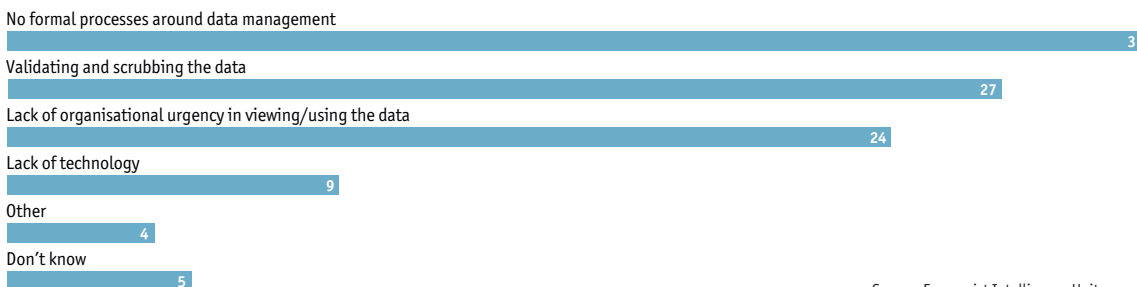


Source: Economist Intelligence Unit survey.

“The process of capturing is actually relatively easy, and these firms have gotten very good at it over the last 10 or 15 years,” says Mr Lepeak of KPMG. He notes that the cost of the actual data, as well as the storage and data warehousing products needed to collect them, has dropped dramatically over the last decade. “But a number of them are struggling to extract value from the data,” he says. “In particular, many are failing to organise them properly so that they can be analysed and queried. And often they don’t have people with the skills to interpret the results.”

Indeed, nearly a third (31%) of survey respondents admit they have no formal processes around data management. But they are loath to stop collecting them, lest something of value slip by.

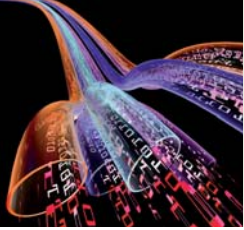
What is typically the cause for delay between collecting data and using them to inform decisions?
 (% respondents)



Source: Economist Intelligence Unit survey.

“Banks and airlines have more data than most other organisations, because we are massively transactional. It is difficult for us to even keep pace, without even thinking about the quality of the data we are collecting.”

Steve Tunstall, Head of Corporate Risk Management, Cathay Pacific Airlines

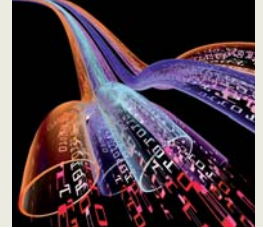


Big data

Harnessing a game-changing asset

“Banks and airlines have more data than most other organisations, because we are massively transactional,” says Cathay Pacific’s Mr Tunstall. “We collect huge amounts of data, some of them gold dust, some completely worthless. It is difficult for us to even keep pace, without even thinking about the quality of the data we are collecting. I mean, I am healthily sceptical of all this, but I have to get on with it just the same.”

While it may not be practical for global organisations to save hundreds of millions of transactions to gain a clear picture of the effects of pricing adjustments, many industry experts believe that larger data sets are beneficial for comprehensive analysis and that new technologies are speeding up the results more effectively. Says David Dunson, professor of statistical science at Duke University, “I would say that the statistics and machine learning communities frown on discarding data and focusing on a sub set. However, often the data are simply so large that one may be forced to be pragmatic. Fortunately, there are increasing numbers of more elegant and efficient alternatives to the naive approach of focusing on a random subsample.”



Growing pains

With any new technology trend, there is a sharp learning curve. It often takes companies years to move from adoption to return. This was the case with IT in general and seems to apply to big data as well.

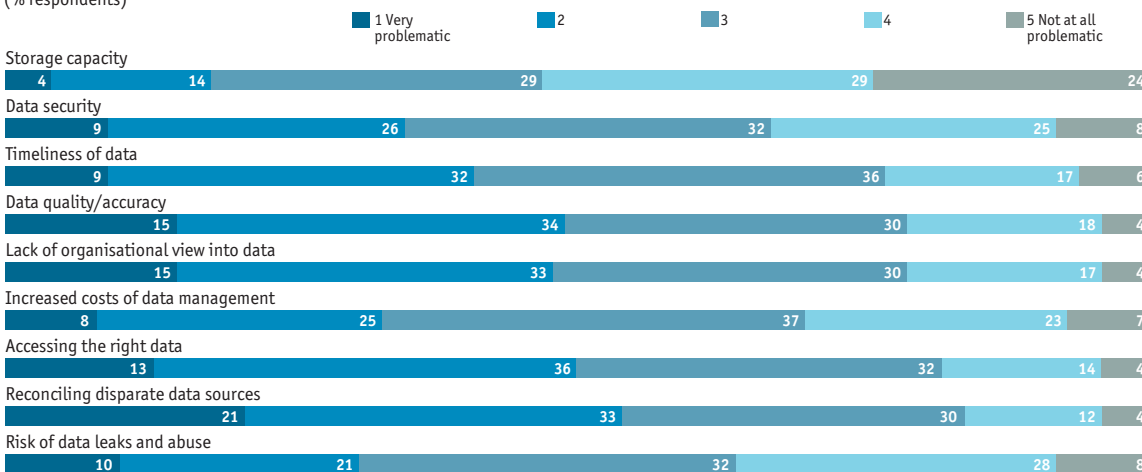
By all accounts, we are in the early years of the era of big data. So it is not surprising that companies are still struggling to understand the nature of this shift and its implications for their business. This is reflected in the work these businesses are doing to lay the groundwork for whatever is to come.

When the Economist Intelligence Unit asked survey respondents about the most challenging aspects of data management, most said they had their storage and security needs under control. They believe the costs are manageable. Of much greater concern, however, is ensuring that their data are accurate and reliable. And by far the most difficult process right now is reconciling disparate data sources.

Please indicate how problematic each of the following is in the management of data in your organisation.

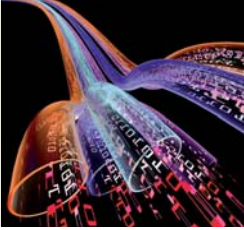
Rate on a scale of 1 to 5, where 1=Very problematic and 5=Not at all problematic.

(% respondents)



Source: Economist Intelligence Unit survey.

Wim Vriens knows this particular challenge all too well. As the European director of business process improvement and new business operations at Levi Strauss & Co, a global apparel company, Mr Vriens has been working for years to reconcile product, customer and sales data across the company's global operations.



Big data

Harnessing a game-changing asset

ManpowerGroup: managing knowledge

Even after valuable data have been collected, analysed and distilled into insights, they need to be effectively disseminated throughout an organisation. To encourage employees to connect with these data on a personal level requires more than a company-wide e-mail.

That was the challenge facing Denis Edwards, CIO of ManpowerGroup, a US\$22bn global workforce solutions provider. Two years ago—leading up to the company’s annual strategy meeting in which important data from across the organisation are shared among the company’s top 170 executives—Mr Edwards needed a way to engage different groups across disciplines with the data. Each data set in the company had its champion, but it was difficult to cross-pollinate the information in a way that would result in an integrated,

comprehensive decision-making framework. “It was a classic knowledge management challenge,” says Mr Edwards.

ManpowerGroup conducted the meeting virtually. The company created 170 different schedules for each of the attendees of the three-day meeting, and meticulously set up sessions that brought together different champions of different data. The structure of the meeting, the context of each session and the thoughtfulness that went into selecting the constituents of each grouping led to a company-wide sharing of knowledge and a new level of strategic alignment.

“In these meetings, we are looking at everything: regional market trends, client mix, socioeconomic indicators, employment law trends, graduation rates and even emerging technologies,” says Mr Edwards. “Putting these folks together helped them create a visceral connection to the data. And it has had measurable effects on our alignment and performance.”

The most common obstacle for companies in extracting value from data is that they have too much data and too few resources

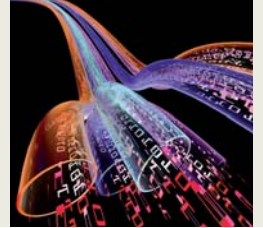
“Like many global companies, we historically have been organised around regions,” says Mr Vriens. “We used to look at the business as Asia-Pacific, Europe and the Americas. We have seen regional sourcing, local manufacturing and different brand execution in different markets. But we are moving the company to a global, brand-led model, so that our products are designed, manufactured and fulfilled in a consistent, common approach. It will allow operational efficiencies, but also better product offerings that our consumers demand.”

Levi Strauss is assembling non-standard, siloed information across multiple regions onto one common platform, using standard taxonomies and a single language. “Through this process, we quickly realised that we had a number of different processes and systems across the various geographies,” says Mr Vriens. “In some cases, we had duplicate entries or inconsistent data.” Getting on top of this was critical for the company to unlock valuable insight from information such as sell-out or customer programmes. “We are only beginning to see the opportunities that this insight can bring to our brands and products,” he says.

Today, the company is on the tail end of a nearly two-year data-reconciliation process, one that will have a profound impact on its global operations. Besides the operational efficiencies, the new system will allow the company to better market fashion trends in different regions and deliver product offerings that meet consumer needs.

Storing, securing and reconciling data are the most fundamental aspects of any data management strategy. But the heavy lifting starts when companies begin extracting meaningful insights from the data and disseminating them throughout the organisation. This critical step in the management of big data is perhaps the least mature of all data management disciplines. Companies struggle with it for many reasons.

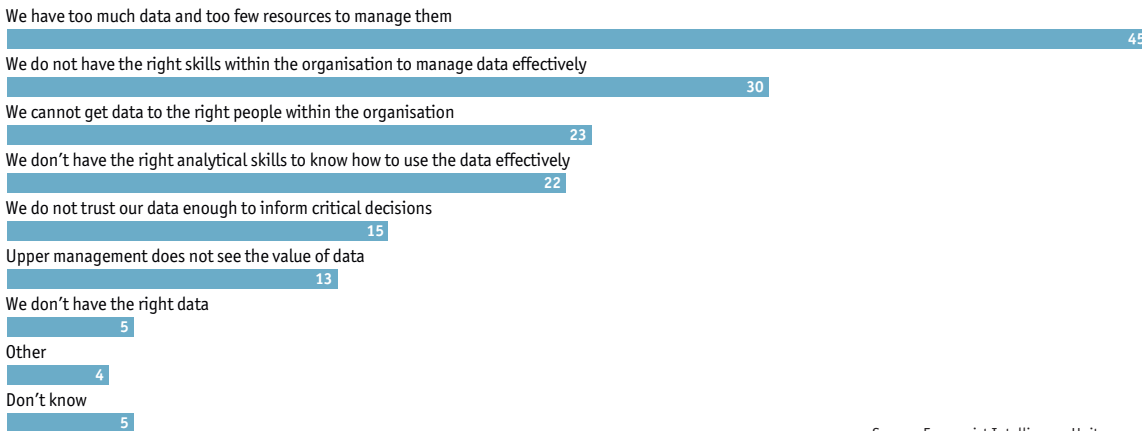
The most common obstacle for companies is that they have too much data and too few resources. The solution, of course, is to either collect fewer data or invest more in data management, finding the



balance that maximises the return. But the other challenges companies face in extracting value from data are harder to fix. For example, lack of the right skills to manage data effectively is among the top two challenges cited by survey respondents.

What are your organisation's biggest challenges in extracting value from data?

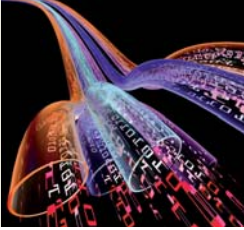
Select up to two.
(% respondents)



Source: Economist Intelligence Unit survey.

Developing the skills base to put data to work will not be a quick fix for any company or any economy. Therefore there are ongoing efforts to build the educational infrastructure needed to breed data scientists. "There is a lot of work to be done there," says Ajay Dhir, CIO at Lanco Group, an Indian energy and construction giant. Mr Dhir recently hired a chief analytics officer to help make the company's massive data stores more useful to the business. "But I didn't hire an IT professional. I put someone with a business background in charge of that team, because I specifically wanted that perspective," he says.

Indeed, universities are working with private industry to develop a new discipline around data science, combining computer science, mathematics, statistical analysis, data visualisation and even social science. This is all in anticipation of an explosion in demand for data scientists, a direct result of big data.



Big data

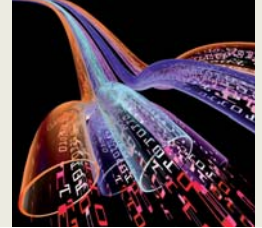
Harnessing a game-changing asset

Stages of evolution

Part of what makes big data so compelling to companies large and small is the competitive gap between companies that manage data effectively and those that do not. Economist Intelligence Unit research indicates that companies fall into four loosely defined categories of big data management: strategic data managers; aspiring data managers; data collectors; and data wasters. Each group has specific characteristics, which the Economist Intelligence Unit assessed by cross-referencing the responses of each against the rest of the survey panel:

- **Data wasters.** To be fair, 30% of data wasters don't prioritise data collection. Yet 70% collect data, and still severely underuse them. These companies underperform financially, and can be found in any industry. Unsurprisingly, they suffer from poor alignment between business and IT and they are much more likely to put a mid-level manager in charge of their data strategy. Other characteristics include the following:
 - They are far more concerned with improving their internal operations, and are focused on internal reporting in particular.
 - They struggle with nearly every aspect of data management (with the exception of security).
 - They lag well behind other companies in their data management investments.
 - They struggle the most by far with maintaining adequate data management skills.

- **Data collectors.** These companies recognise the importance of data, but lack the resources to do anything about them, beyond storing them. They are submerged in data. Companies in the healthcare and professional services industries are likely to be found in this category. Other characteristics include the following:
 - They are the most likely to put a senior IT executive in charge of data strategy.
 - They suffer from poor IT/business alignment, with nearly one-quarter maintaining that IT does not understand the importance of data; another quarter says the same of the business side.
 - They struggle the most with data quality, accuracy and reconciliation.
 - Their data management efforts are most likely to be driven by meeting regulatory requirements.
 - They do not invest as much in almost every aspect of data management, but especially in skills.
 - They are unlikely to have any kind of formal process for data governance in place.



U.S. Gas & Electric: preparing for the deluge

Most organisations never saw the era of big data coming. Digital technologies were adopted so quickly, it is hard to blame companies for being unprepared. But some industries are still waiting to go fully digital, and have seen their colleagues in other fields go through the fires first. U.S. Gas & Electric, a major energy retailer in 12 states, has been watching closely.

“Our industry is on the cusp of smart metres,” says Greg Taffet, CIO of U.S. Gas & Electric. Mr Taffet is referring to the digital devices that will deliver a steady stream of real-time demand and usage information from customer homes to utility providers. Electricity providers manually read metres once a month, feed the data into complex algorithms that take into account historical weather and demand patterns, and make purchasing and pricing decisions based on the results. “We have a very general statistical analysis, and there

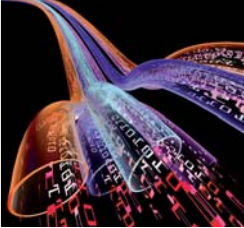
is still a lot of interpretation of the data involved,” says Mr Taffet.

Within the next five to ten years, however, smart metres will begin streaming usage data to both U.S. Gas & Electric and its customers, significantly affecting the company’s business model. For example, customers are likely to be much more energy-conscious with more usage data at their disposal. And U.S. Gas & Electric will have an opportunity to offer new services, such as recommending services to an air conditioning unit or comparing real-time energy usage to other people in a customer’s neighbourhood. Indeed, U.S. Gas & Electric may even begin expanding into ancillary businesses, such as selling high-efficiency air conditioners or offering insulation services.

“We think this has the opportunity to benefit both our customers and our own business model,” says Mr Taffet. But the new data will not come without costs. He estimates that smart metres will result in 1,000 times the data coming through his systems. In preparation, Mr Taffet is investing heavily in infrastructure, especially storage and processing capacity. “It is going to be a game changer,” he says.

- **Aspiring data managers.** This is the largest group. These companies have fully embraced the importance of big data to the future of their company. They allow data to inform strategic decisions, and invest in them aggressively. But they still lag behind the leaders. Companies in the communications and retail industries are most likely to be found in this category. Further characteristics include the following:
 - They are slightly less likely to put their CEO in charge of data strategy.
 - They are currently leveraging data to learn more about their internal business operations, but are hoping to put more data to customer-facing uses.
 - Unlike strategic data managers, they still struggle to clean and reconcile their data fully.
 - Sixty-six percent put only about one-half of their valuable data to good use.
 - They are the most likely to complain that they have too much data, and not enough resources.

- **Strategic data managers.** This is the most advanced group of big data managers, with the most mature capabilities. They are most likely to be found among manufacturing, financial services or technology companies. Strategic data managers first identify specific measurements and data points that align closely with corporate strategic goals. Other characteristics include:
 - They select the most appropriate data to make decisions, and use a high percentage of the data they collect.
 - A C-level executive runs their data operations.
 - They invest heavily in all aspects of data management, especially ensuring accurate, complete and integrated data.
 - They explore emerging data sets for potential value.



Big data

Harnessing a game-changing asset

ABN AMRO: on the leading edge of data management

Banks are traditionally considered to be the most advanced in data management. Highly transactional and digitally advanced, some financial services companies are difficult to distinguish from IT firms. They invest heavily in data infrastructure, as well as in the skills needed to analyse and interpret digital information. "Analysing financial data is the starting point of any financial institution," says Paul Scholten, chief operating officer (COO) of ABN AMRO's retail and private banking business.

Mr Scholten says that ABN AMRO has done most of the foundational work that other companies struggle with in these early days of big data. It has clean, complete financial data on both its customers and their internal operations. ABN AMRO captures nearly everything (for regulatory purposes), but only uses the most valuable data for insight. And it actively seeks out new sources of data.

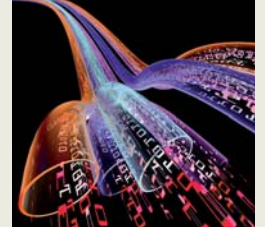
But being on the leading edge of data management is not without its challenges. Mr Scholten points to three obstacles that businesses across the financial services sector are facing. The first is privacy. "We

have the data and tools that can help our customers understand their spending habits at a deep level," he says. "We can help them analyse their investment strategies, understand their tax situation better and save money. But we run into privacy issues with these things, and we have to be careful about what belongs to us, what belongs to customers and what belongs to the government."

Second, Mr Scholten is grappling with the company's unstructured data. "We are used to structured, financial data," he says. "We are not so good at the unstructured stuff." He says the company is just beginning to understand the uses of social media, and what might be possible in terms of improving customer service.

Third, despite its data management prowess, Mr Scholten says the bank is still considering ways to combine data across functions to yield new insights. For instance, though ABN AMRO has an advanced risk analysis department, it does not cross-reference these data with marketing, regulatory or customer data sets. "We are working on that," he says. "There is value to be had there." In particular, Mr Scholten says that cross-referencing client complaints with operational risk might yield deeper insight into how operational problems affect customer service.

These categories represent a continuum of competency around data management. The characteristics of each group are likely to change as the discipline evolves. But at this point in time, it is a useful categorisation that will help these companies to better understand the challenges ahead.



Conclusion

Big data is changing the way companies of all sizes, in all industries, go about their business. From the way they understand their markets, to how they mine information about their own operations, big data is unlocking insight at every turn. It has become an industry in and of itself, spawning new businesses dedicated to enabling the collection and analysis of big data. And its transformative effects on existing companies have been dramatic.

When the Economist Intelligence Unit asked survey respondents to describe the impact data has had on their organisation over the past five years, nearly 10% said it had completely changed the way they do business. Forty-six percent of respondents said it had become an important factor that drives business decisions.

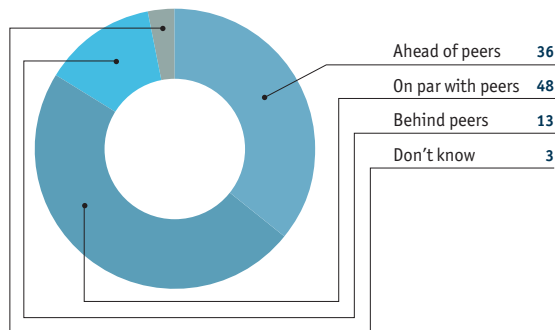
There is no reason to think these trends will not continue. Of course, big data will always be but one of the tools that companies use to inform decisions. But it is an increasingly critical part of that portfolio. And companies that fail to develop a competency around it are likely to be left behind.

Fortunately, the science of extracting insight from data is constantly evolving. Tools are more readily available as industries begin to invest in the technology that supports big data. And as the competency levels of firms continue to move along the big data continuum, increasing value will be realised.

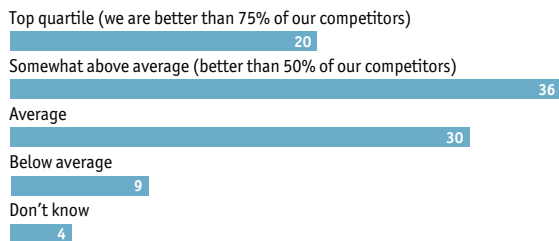
Appendix: Survey results

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

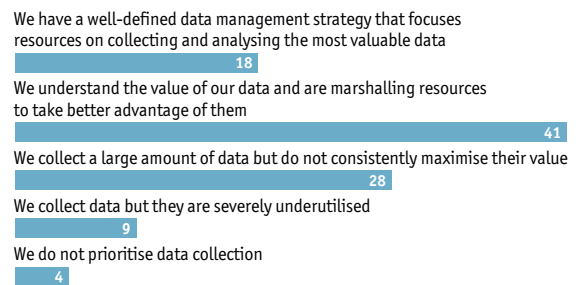
How would you rate your organisation's financial performance in its most recent fiscal year compared with that of your competitors?
(% respondents)



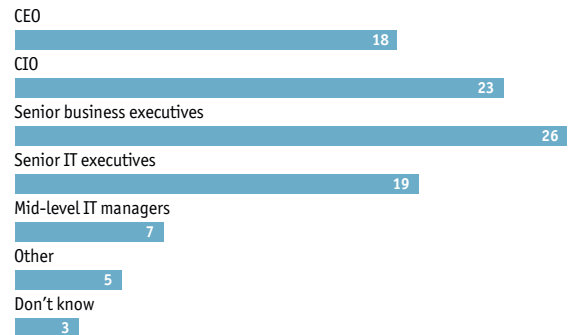
How would you rate your organisation's use of data compared with that of your competitors?
(% respondents)



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



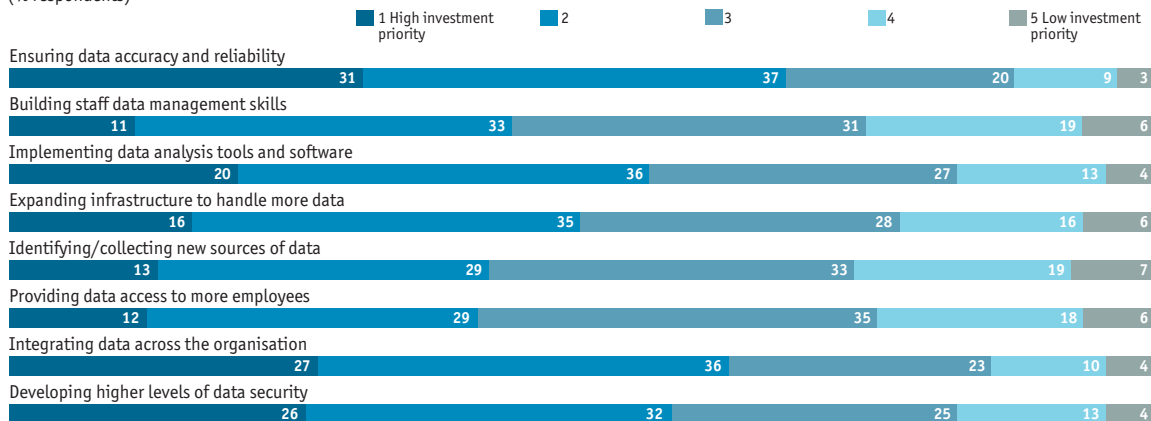
Who is primarily responsible for your organisation's data management strategy?
(% respondents)



Please indicate the level of investment priority for the following aspects of data management.

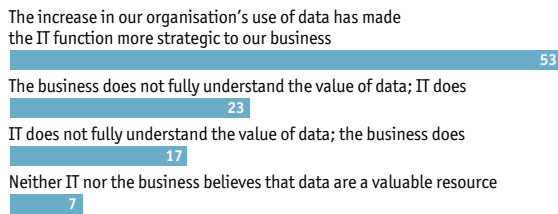
Rate on a scale of 1 to 5, where 1=High investment priority and 5=Low investment priority.

(% respondents)



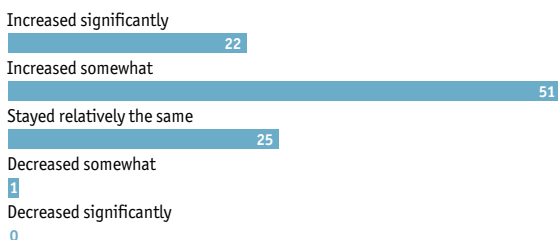
Which statement best describes the relationship IT has with the business with regard to data?

(% respondents)



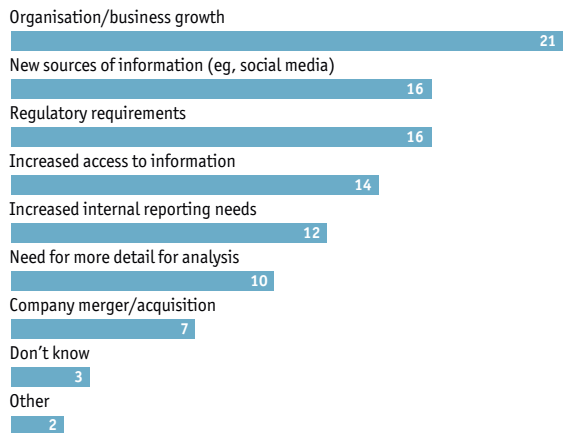
Over the last 12 months, my organisation's collection of data has...

(% respondents)



Which of the following has had the biggest impact on the data your organisation collects?

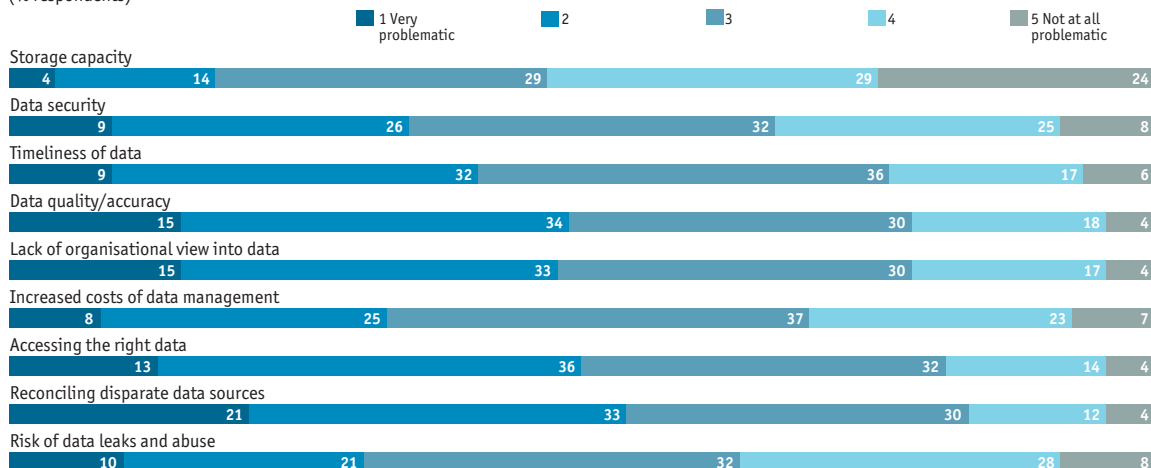
(% respondents)



Please indicate how problematic each of the following is in the management of data in your organisation.

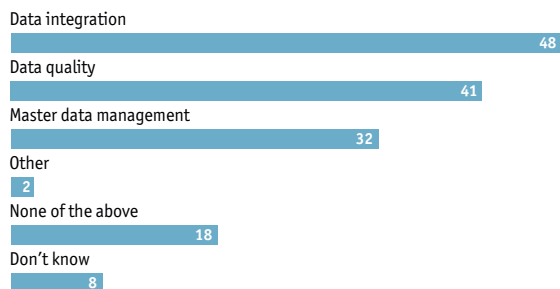
Rate on a scale of 1 to 5, where 1=Very problematic and 5=Not at all problematic.

(% respondents)



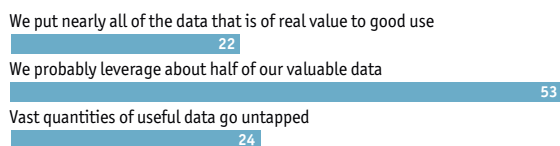
Which of the following, if any, data quality initiatives have you implemented? Select all that apply.

(% respondents)



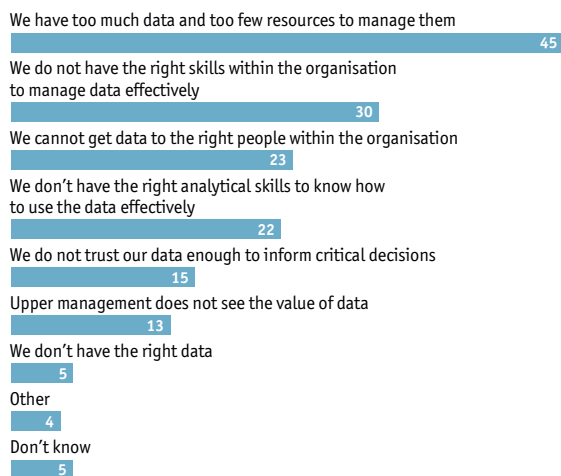
Which of the following statements most accurately describes your organisation's use of the data it collects?

(% respondents)



What are your organisation's biggest challenges in extracting value from data? Select up to two.

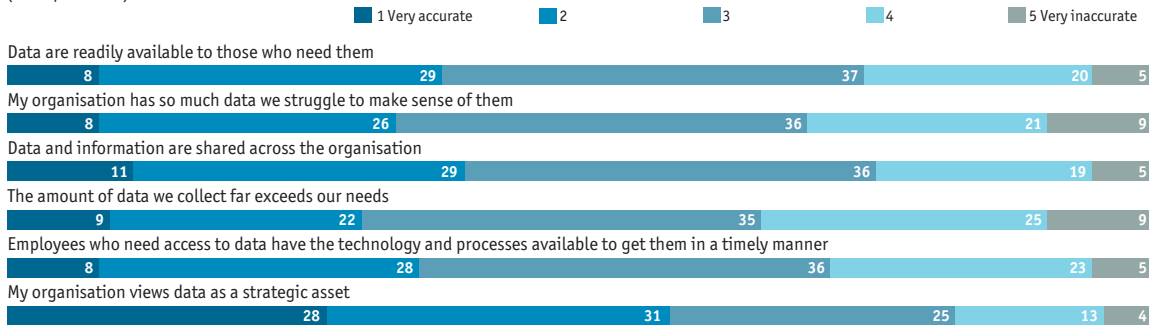
(% respondents)



Please indicate how accurately each of the following statements describes your organisation.

Rate on a scale of 1 to 5, where 1=Very accurate and 5=Very inaccurate.

(% respondents)



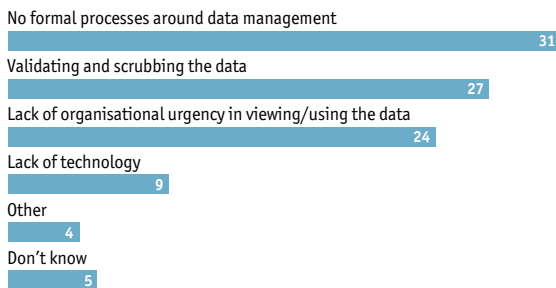
How difficult is it to access your organisation's data in a timely manner?

(% respondents)



What is typically the cause for delay between collecting data and using them to inform decisions?

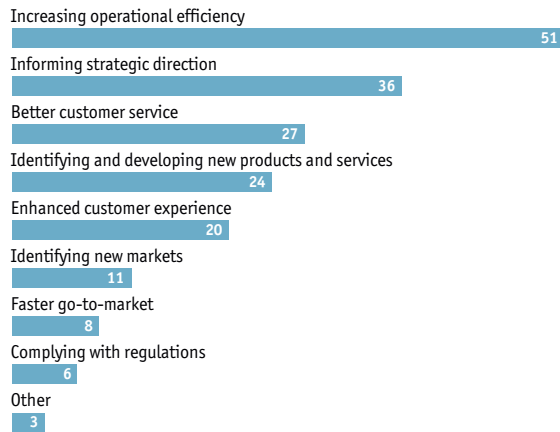
(% respondents)



What new opportunities do you see for your organisation as the result of the availability of increased amounts of data?

Select up to two.

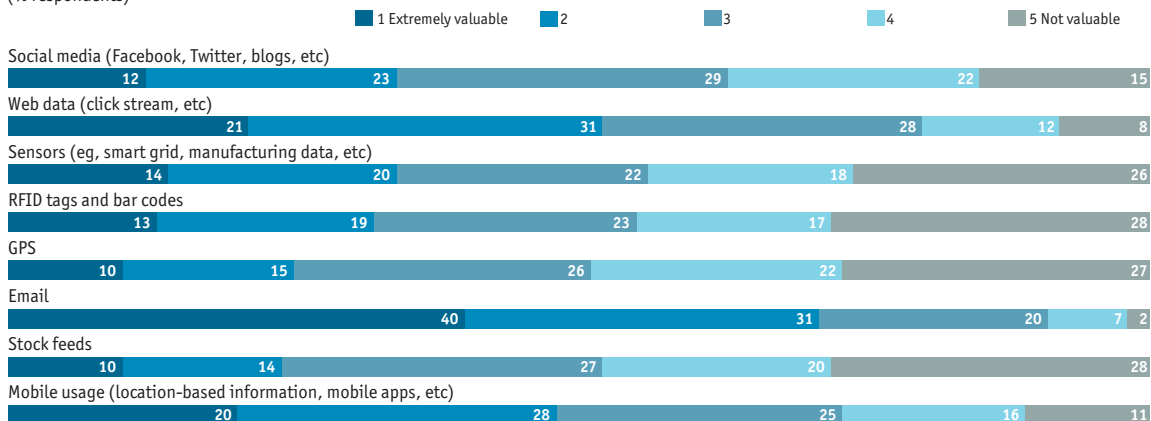
(% respondents)



Please indicate the value to your organisation of the following new sources of data.

Rate on a scale of 1 to 5, where 1=Extremely valuable and 5=Not valuable.

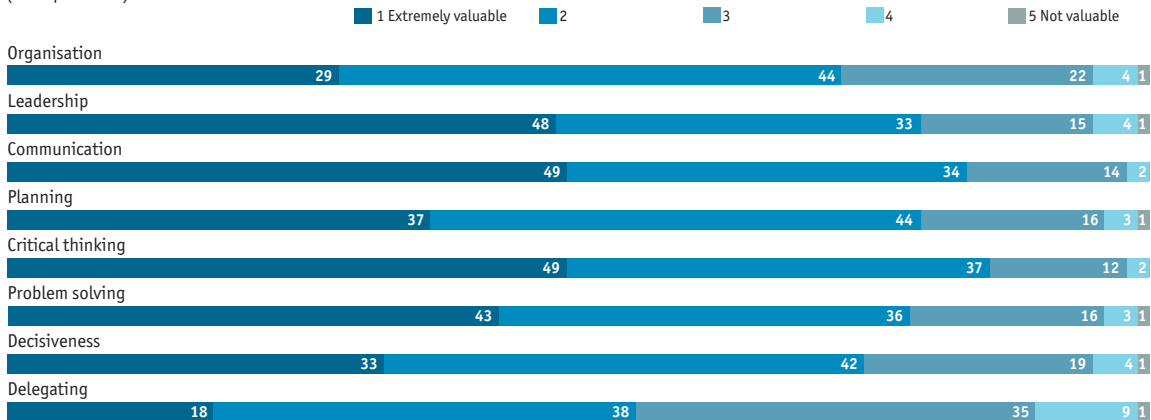
(% respondents)



Please rate the value of the following workforce skills during this era of big data.

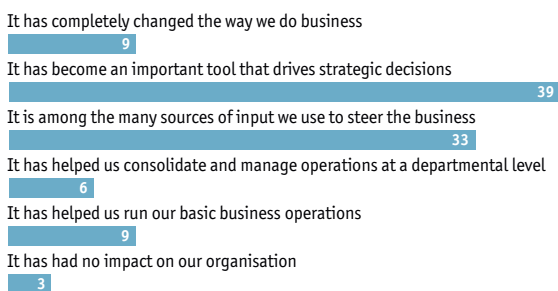
Rate on a scale of 1 to 5, where 1=Extremely valuable and 5=Not valuable.

(% respondents)



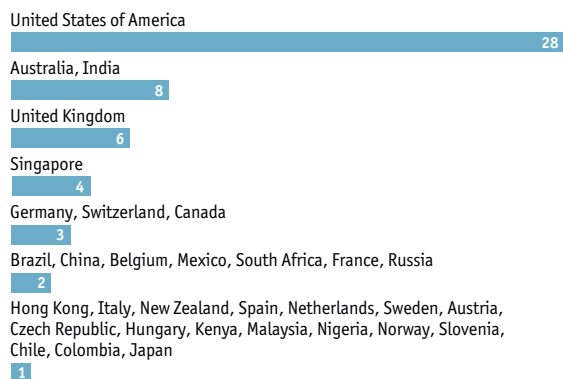
Which of the following best describes the impact collection or use of data has had on your organisation over the past five years?

(% respondents)



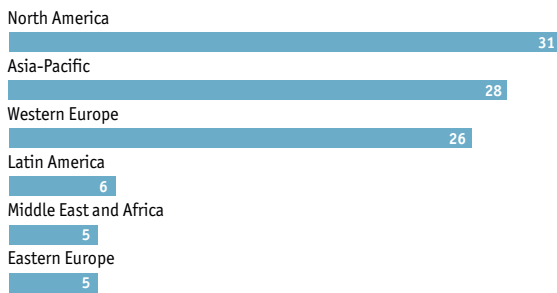
In which country are you personally located?

(% respondents)



In which region are you personally based?

(% respondents)



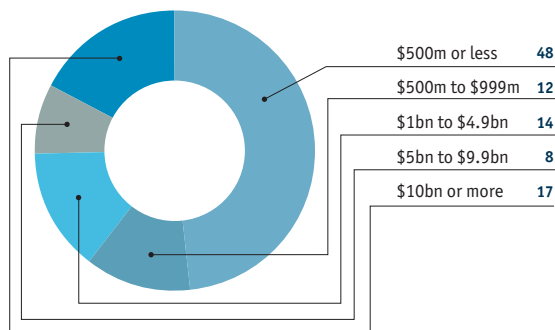
What is your primary industry?

(% respondents)



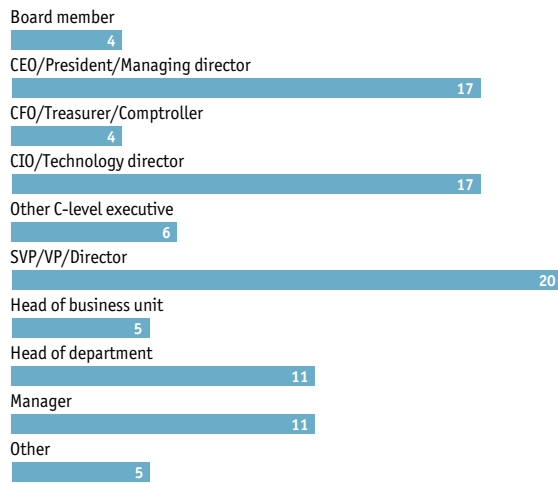
What are your organisation's global annual revenues in US dollars?

(% respondents)



Which of the following best describes your title?

(% respondents)



What is your main functional role?

(% respondents)



Whilst every effort has been taken to verify the accuracy of this information, neither The Economist Intelligence Unit Ltd. nor the sponsors of this report can accept any responsibility or liability for reliance by any person on this white paper or any of the information, opinions or conclusions set out in the white paper.

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