Big data
Harnessing a game-changing asset

A report from the Economist Intelligence Unit
Sponsored by SAS
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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
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
\(^3\) 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.
Big data
Harnessing a game-changing asset

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.

Data matter

<table>
<thead>
<tr>
<th>How would you rate your organisation’s financial performance in its most recent fiscal year compared with that of your competitors?</th>
</tr>
</thead>
<tbody>
<tr>
<td>(% respondents)</td>
</tr>
<tr>
<td>Strategic data users</td>
</tr>
<tr>
<td>Ahead of peers</td>
</tr>
<tr>
<td>53</td>
</tr>
<tr>
<td>Data valuers</td>
</tr>
<tr>
<td>Ahead of peers</td>
</tr>
<tr>
<td>33</td>
</tr>
<tr>
<td>Data collectors</td>
</tr>
<tr>
<td>Ahead of peers</td>
</tr>
<tr>
<td>36</td>
</tr>
<tr>
<td>Data wasters</td>
</tr>
<tr>
<td>Ahead of peers</td>
</tr>
<tr>
<td>24</td>
</tr>
</tbody>
</table>

Source: Economist Intelligence Unit survey.
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%.  

“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...
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?

<table>
<thead>
<tr>
<th>Role</th>
<th>% Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEO</td>
<td>18</td>
</tr>
<tr>
<td>CIO</td>
<td>23</td>
</tr>
<tr>
<td>Senior business executives</td>
<td>26</td>
</tr>
<tr>
<td>Senior IT executives</td>
<td>19</td>
</tr>
<tr>
<td>Mid-level IT managers</td>
<td>7</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
</tr>
<tr>
<td>Don’t know</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: Economist Intelligence Unit survey.

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

<table>
<thead>
<tr>
<th>Statement</th>
<th>% Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>The increase in our organisation’s use of data has made the IT function more strategic to our business</td>
<td>53</td>
</tr>
<tr>
<td>The business does not fully understand the value of data; IT does</td>
<td>23</td>
</tr>
<tr>
<td>IT does not fully understand the value of data; the business does</td>
<td>19</td>
</tr>
<tr>
<td>Neither IT nor the business believes that data are a valuable resource</td>
<td>7</td>
</tr>
</tbody>
</table>

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.”

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)

- Increasing operational efficiency: 51
- Informing strategic direction: 36
- Better customer service: 27
- Identifying and developing new products and services: 24
- Enhanced customer experience: 20
- Identifying new markets: 11
- Faster go-to-market: 8
- Complying with regulations: 6
- Other: 3

Source: Economist Intelligence Unit survey.
“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 Managers 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

A bout 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 indentifying 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)

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
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<tbody>
<tr>
<td>Increased significantly</td>
<td>22</td>
</tr>
<tr>
<td>Increased somewhat</td>
<td>51</td>
</tr>
<tr>
<td>Stayed relatively the same</td>
<td>25</td>
</tr>
<tr>
<td>Decreased somewhat</td>
<td>1</td>
</tr>
<tr>
<td>Decreased significantly</td>
<td>0</td>
</tr>
</tbody>
</table>

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.)

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?**

<table>
<thead>
<tr>
<th>(% respondents)</th>
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<tbody>
<tr>
<td>We put nearly all of the data that is of real value to good use</td>
<td>22</td>
</tr>
<tr>
<td>We probably leverage about half of our valuable data</td>
<td>53</td>
</tr>
<tr>
<td>Vast quantities of useful data go untapped</td>
<td>24</td>
</tr>
</tbody>
</table>

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?**

<table>
<thead>
<tr>
<th>(% respondents)</th>
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</thead>
<tbody>
<tr>
<td>No formal processes around data management</td>
<td>31</td>
</tr>
<tr>
<td>Validating and scrubbing the data</td>
<td>27</td>
</tr>
<tr>
<td>Lack of organisational urgency in viewing/using the data</td>
<td>24</td>
</tr>
<tr>
<td>Lack of technology</td>
<td>9</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
</tr>
<tr>
<td>Don’t know</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Economist Intelligence Unit survey.
“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.

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.
“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)

<table>
<thead>
<tr>
<th>Challenge</th>
<th>% Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>We have too much data and too few resources to manage them</td>
<td>45</td>
</tr>
<tr>
<td>We do not have the right skills within the organisation to manage data effectively</td>
<td>30</td>
</tr>
<tr>
<td>We cannot get data to the right people within the organisation</td>
<td>23</td>
</tr>
<tr>
<td>We don’t have the right analytical skills to know how to use the data effectively</td>
<td>22</td>
</tr>
<tr>
<td>We do not trust our data enough to inform critical decisions</td>
<td>15</td>
</tr>
<tr>
<td>Upper management does not see the value of data</td>
<td>13</td>
</tr>
<tr>
<td>We don’t have the right data</td>
<td>13</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
</tr>
<tr>
<td>Don’t know</td>
<td>5</td>
</tr>
</tbody>
</table>

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.
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.
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.

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.
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. ABM 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.
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)

- Ahead of peers: 36
- On par with peers: 48
- Behind peers: 13
- Don’t know: 3

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

- We have a well-defined data management strategy that focuses resources on collecting and analysing the most valuable data: 43
- We understand the value of our data and are marshalling resources to take better advantage of them: 51
- We collect a large amount of data but do not consistently maximise their value: 10
- We collect data but they are severely underutilised: 7
- We do not prioritise data collection: 4

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

- Top quartile (we are better than 75% of our competitors): 20
- Somewhat above average (better than 50% of our competitors): 36
- Average: 30
- Below average: 13
- Don’t know: 4

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

- CEO: 18
- CIO: 23
- Senior business executives: 26
- Senior IT executives: 19
- Mid-level IT managers: 7
- Other: 5
- Don’t know: 4

Economist Intelligence Unit 2011
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)

<table>
<thead>
<tr>
<th>Aspect</th>
<th>1 High investment priority</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 Low investment priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensuring data accuracy and reliability</td>
<td>31</td>
<td>17</td>
<td>20</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Building staff data management skills</td>
<td>33</td>
<td>31</td>
<td>19</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Implementing data analysis tools and software</td>
<td>31</td>
<td>27</td>
<td>16</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Expanding infrastructure to handle more data</td>
<td>28</td>
<td>35</td>
<td>16</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Identifying/collecting new sources of data</td>
<td>33</td>
<td>29</td>
<td>19</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Providing data access to more employees</td>
<td>35</td>
<td>29</td>
<td>18</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Integrating data across the organisation</td>
<td>32</td>
<td>27</td>
<td>10</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Developing higher levels of data security</td>
<td>32</td>
<td>25</td>
<td>13</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

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

The increase in our organisation’s use of data has made the IT function more strategic to our business
53
The business does not fully understand the value of data; IT does
23
IT does not fully understand the value of data; the business does
77
Neither IT nor the business believes that data are a valuable resource
7

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

Increased significantly
22
Increased somewhat
51
Stayed relatively the same
49
Decreased somewhat
1
Decreased significantly
0

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

Organisation/business growth
21
New sources of information (eg, social media)
16
Regulatory requirements
16
Increased access to information
14
Increased internal reporting needs
12
Need for more detail for analysis
10
Company merger/acquisition
7
Don’t know
3
Other
2
Appendix
Survey results

Big data
Harnessing a game-changing asset

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)

<table>
<thead>
<tr>
<th>Problem</th>
<th>1 Very problematic</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 Not at all problematic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage capacity</td>
<td>2</td>
<td>14</td>
<td>29</td>
<td>29</td>
<td>24</td>
</tr>
<tr>
<td>Data security</td>
<td>9</td>
<td>26</td>
<td>32</td>
<td>25</td>
<td>8</td>
</tr>
<tr>
<td>Timeliness of data</td>
<td>9</td>
<td>32</td>
<td>16</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>Data quality/accuracy</td>
<td>15</td>
<td>34</td>
<td>30</td>
<td>18</td>
<td>4</td>
</tr>
<tr>
<td>Lack of organisational view into data</td>
<td>15</td>
<td>33</td>
<td>30</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>Increased costs of data management</td>
<td>8</td>
<td>25</td>
<td>37</td>
<td>23</td>
<td>7</td>
</tr>
<tr>
<td>Accessing the right data</td>
<td>13</td>
<td>36</td>
<td>32</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>Reconciling disparate data sources</td>
<td>21</td>
<td>33</td>
<td>30</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Risk of data leaks and abuse</td>
<td>10</td>
<td>21</td>
<td>32</td>
<td>28</td>
<td>8</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Initiative</th>
<th>48</th>
<th>41</th>
<th>32</th>
<th>3</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data integration</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Data quality</td>
<td></td>
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<tr>
<td>Master data management</td>
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<tr>
<td>Other</td>
<td></td>
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</tr>
<tr>
<td>None of the above</td>
<td></td>
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<tr>
<td>Don't know</td>
<td></td>
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</tr>
</tbody>
</table>

What are your organisation’s biggest challenges in extracting value from data? Select up to two. (% respondents)

<table>
<thead>
<tr>
<th>Challenge</th>
<th>45</th>
<th>30</th>
<th>23</th>
<th>22</th>
<th>15</th>
<th>13</th>
<th>5</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>We have too much data and too few resources to manage them</td>
<td></td>
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<tr>
<td>We do not have the right skills within the organisation to manage data effectively</td>
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<tr>
<td>We cannot get data to the right people within the organisation</td>
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</tr>
<tr>
<td>We don’t have the right analytical skills to know how to use the data effectively</td>
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<tr>
<td>We do not trust our data enough to inform critical decisions</td>
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</tr>
<tr>
<td>Upper management does not see the value of data</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We don’t have the right data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don’t know</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Statement</th>
<th>53</th>
<th>26</th>
<th>15</th>
<th>5</th>
<th>15</th>
<th>13</th>
<th>5</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>We put nearly all of the data that is of real value to good use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We probably leverage about half of our valuable data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vast quantities of useful data go untapped</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don’t know</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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)

<table>
<thead>
<tr>
<th>Statement</th>
<th>1 Very accurate</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 Very inaccurate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data are readily available to those who need them</td>
<td>8</td>
<td>29</td>
<td>37</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>My organisation has so much data we struggle to make sense of them</td>
<td>3</td>
<td>26</td>
<td>36</td>
<td>21</td>
<td>9</td>
</tr>
<tr>
<td>Data and information are shared across the organisation</td>
<td>9</td>
<td>29</td>
<td>36</td>
<td>19</td>
<td>5</td>
</tr>
<tr>
<td>The amount of data we collect far exceeds our needs</td>
<td>9</td>
<td>22</td>
<td>35</td>
<td>25</td>
<td>9</td>
</tr>
<tr>
<td>Employees who need access to data have the technology and processes available to get them in a timely manner</td>
<td>5</td>
<td>28</td>
<td>36</td>
<td>23</td>
<td>5</td>
</tr>
<tr>
<td>My organisation views data as a strategic asset</td>
<td>28</td>
<td>31</td>
<td>25</td>
<td>13</td>
<td>4</td>
</tr>
</tbody>
</table>

How difficult is it to access your organisation’s data in a timely manner? (% respondents)

- Extremely difficult: 3
- Difficult: 55
- Not difficult: 39
- Don’t know: 3

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

- No formal processes around data management: 31
- Validating and scrubbing the data: 27
- Lack of organisational urgency in viewing/using the data: 24
- Lack of technology: 9
- Other: 4
- Don’t know: 2

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)

- Increasing operational efficiency: 51
- Informing strategic direction: 36
- Better customer service: 27
- Identifying and developing new products and services: 24
- Enhanced customer experience: 20
- Identifying new markets: 11
- Faster go-to-market: 8
- Complying with regulations: 6
- Other: 1
### Appendix

#### Survey results

## Big data

**Harnessing a game-changing asset**

### 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)

<table>
<thead>
<tr>
<th>Source of Data</th>
<th>1 Extremely valuable</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 Not valuable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social media (Facebook, Twitter, blogs, etc)</td>
<td>12</td>
<td>23</td>
<td>29</td>
<td>22</td>
<td>15</td>
</tr>
<tr>
<td>Web data (click stream, etc)</td>
<td>21</td>
<td>31</td>
<td>28</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Sensors (eg, smart grid, manufacturing data, etc)</td>
<td>14</td>
<td>22</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RFID tags and bar codes</td>
<td>13</td>
<td>19</td>
<td>23</td>
<td>17</td>
<td>28</td>
</tr>
<tr>
<td>GPS</td>
<td>10</td>
<td>15</td>
<td>26</td>
<td>22</td>
<td>27</td>
</tr>
<tr>
<td>Email</td>
<td>10</td>
<td>14</td>
<td>31</td>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td>Stock feeds</td>
<td>10</td>
<td>16</td>
<td>27</td>
<td>20</td>
<td>29</td>
</tr>
<tr>
<td>Mobile usage (location-based information, mobile apps, etc)</td>
<td>20</td>
<td>28</td>
<td>25</td>
<td>16</td>
<td>11</td>
</tr>
</tbody>
</table>

### 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)

<table>
<thead>
<tr>
<th>Workforce Skill</th>
<th>1 Extremely valuable</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 Not valuable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation</td>
<td>29</td>
<td>44</td>
<td>22</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Leadership</td>
<td>48</td>
<td>33</td>
<td>15</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>49</td>
<td>34</td>
<td>14</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td>37</td>
<td>44</td>
<td>16</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Critical thinking</td>
<td>49</td>
<td>37</td>
<td>12</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Problem solving</td>
<td>43</td>
<td>36</td>
<td>16</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Decisiveness</td>
<td>33</td>
<td>42</td>
<td>19</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Delegating</td>
<td>18</td>
<td>35</td>
<td>6</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

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

- It has completely changed the way we do business
- It has become an important tool that drives strategic decisions
- It is among the many sources of input we use to steer the business
- It has helped us consolidate and manage operations at a departmental level
- It has helped us run our basic business operations
- It has had no impact on our organisation

### In which country are you personally located?  
(% respondents)

<table>
<thead>
<tr>
<th>Country</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States of America</td>
<td>28</td>
</tr>
<tr>
<td>Australia, India</td>
<td>8</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>6</td>
</tr>
<tr>
<td>Singapore</td>
<td>4</td>
</tr>
<tr>
<td>Germany, Switzerland, Canada</td>
<td>3</td>
</tr>
<tr>
<td>Brazil, China, Belgium, Mexico, South Africa, France, Russia</td>
<td>3</td>
</tr>
<tr>
<td>Hong Kong, Italy, New Zealand, Spain, Netherlands, Sweden, Austria, Czech Republic, Hungary, Kenya, Malaysia, Nigeria, Norway, Slovenia, Chile, Colombia, Japan</td>
<td>1</td>
</tr>
</tbody>
</table>
Appendix

Survey results

Big data
Harnessing a game-changing asset

In which region are you personally based? (% respondents)
- North America: 31%
- Asia-Pacific: 28%
- Western Europe: 26%
- Latin America: 6%
- Middle East and Africa: 5%
- Eastern Europe: 5%

What is your primary industry? ( % respondents)
- Financial services: 13%
- Professional services, Manufacturing: 11%
- IT and technology: 10%
- Healthcare, pharmaceuticals and biotechnology: 8%
- Education: 6%
- Energy and natural resources: 5%
- Consumer goods, Entertainment, media and publishing, Government/Public sector, Logistics and distribution, Construction and real estate, Retailing: 5%
- Telecommunications, Transportation, travel and tourism, Automotive, Agriculture and agribusiness, Aerospace/Defence, Chemicals: 2%

What are your organisation’s global annual revenues in US dollars? ( % respondents)
- $500m or less: 48%
- $500m to $999m: 12%
- $1bn to $4.9bn: 14%
- $5bn to $9.9bn: 8%
- $10bn or more: 17%

Which of the following best describes your title? ( % respondents)
- Board member: 4%
- CEO/President/Managing director: 17%
- CFO/Treasurer/Comptroller: 4%
- CIO/Technology director: 17%
- Other C-level executive: 6%
- SVP/VP/Director: 20%
- Head of business unit: 5%
- Head of department: 11%
- Manager: 11%
- Other: 5%

What is your main functional role? ( % respondents)
- IT: 45%
- General management: 14%
- Strategy and business development: 11%
- Finance: 10%
- Marketing and sales: 9%
- Operations and production: 6%
- Other: 2%
- Information and research: 2%
- Risk: 2%
- Supply-chain management: 2%
- Customer service: 2%
- Human resources: 2%
- R&D: 1%
- Legal: 0%
- Procurement: 0%
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