



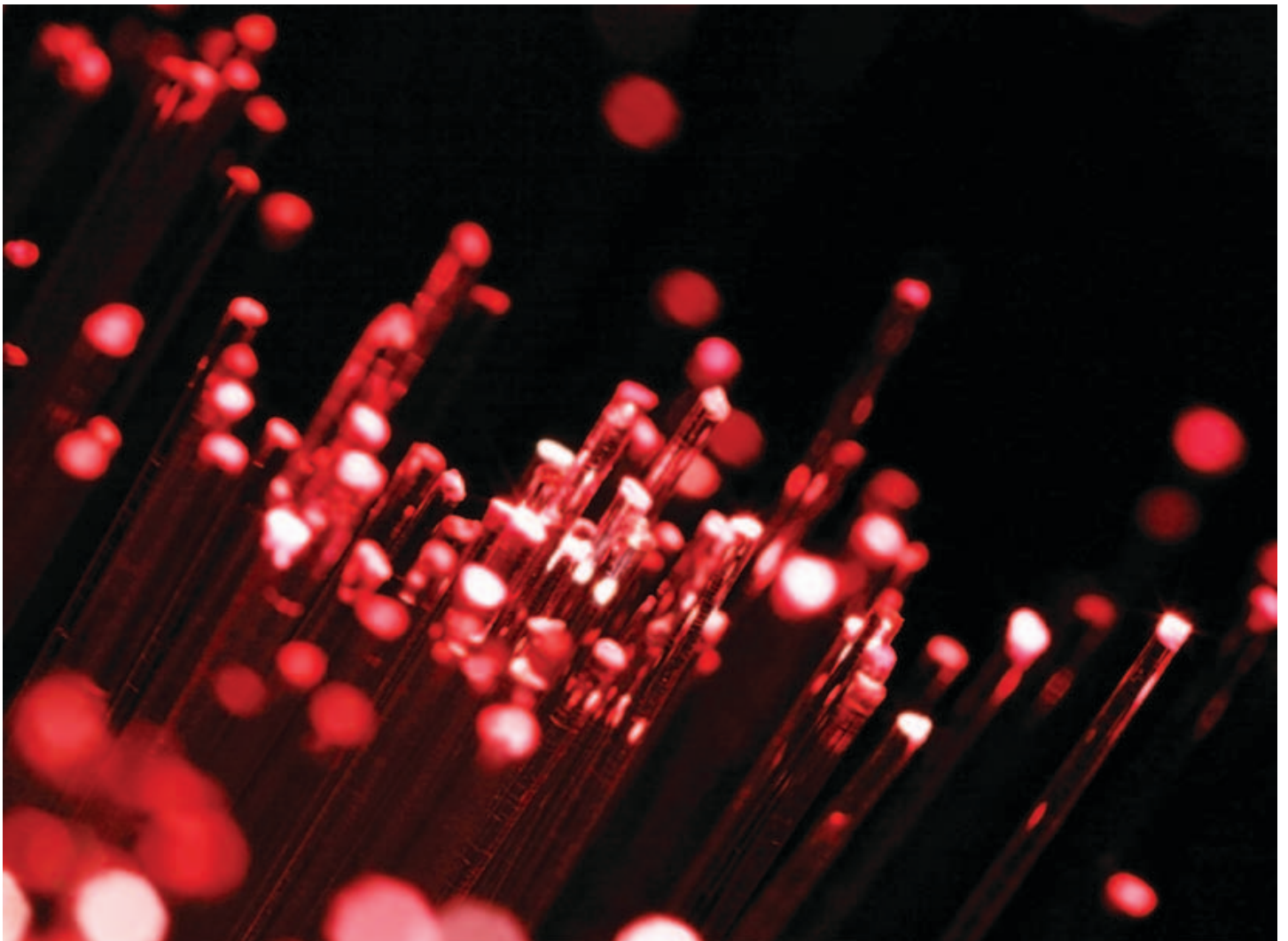
The Association of
Accountants and
Financial Professionals
in Business

The global
body for
professional
accountants



Accountancy Futures Academy

Big data: its power and perils



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By looking to the future it helps the profession stay at the cutting edge. The Academy's work fosters fresh thinking and innovative discussions, identifies the barriers to and facilitators of tomorrow's successes, and identifies the potential strategies that will enable business and finance to navigate the choppy waters that lie ahead.

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This report sets out to give a balanced picture of the impact of big data on the accountancy and finance professions in the coming 5 to 10 years.

It is framed by the question, 'How will big data affect businesses over the next 5 to 10 years, and what opportunities and challenges will it create for the accountancy profession?'

As a piece of 'futures thinking', it does not claim to predict the future. Instead, it identifies and explores the big data trends likely to affect the accountancy profession globally in the coming years.



Faye Chua
Head of Future Research, ACCA

Faye Chua is ACCA's head of future research and leads ACCA's global research and insights work that focuses on the future directions of business and the accountancy profession across a range of subjects. She has over 10 years of experience in research across different sectors of the economy and has worked in North America, Asia Pacific and Europe.

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See Appendix for the full details of contributors.



This report was written for ACCA and IMA by The Futures Company.

Foreword

'Big data' has become a business buzzword, and its promise and pitfalls are gaining increasing attention from business and the media globally. The vast quantity of data collected, stored and transferred by new technologies is reshaping priorities for many businesses, and the development of new analytical tools is aligning with other deep shifts in the way that companies work to transform the business landscape.

ACCA's Accountancy Futures Academy has long had the rise of big data on the horizon. In 2012, ACCA and IMA published *100 Drivers of Change for the Global Accountancy Profession*, a report that highlights big data as one of the key factors shaping the future for accountants and finance professionals over the next decade. Subsequently, the Accountancy Futures Academy has undertaken this new research that explores in depth the opportunities and challenges big data will present the accountancy and finance profession.

As business is transformed by the impact of big data and big data analytics, so the role of finance professionals will change as well. The paradox of this new technology is that it has the potential to commoditise some traditional aspects of the profession, but it also provides the opportunity for finance professionals to move 'upstream', shifting to a more strategic decision making role within businesses. As big data accelerates the process by which business reimagines itself, the accountancy profession will have to reinvent itself.

Accountants and finance professionals are well placed to take an active role in big data by providing a new and critical service: 'distilling' vast amounts of information into actionable insights. In addition, professional accountants are the ethical heart of the company and they can help act as custodians of non-financial datasets and set quality and ethical standards for the information used in making strategic decisions. The role of accountants will become increasingly important as more companies look for ways of developing new products and services from data they generate and own, particularly within the context of growing concerns around privacy and ethical data usage.

The speed at which big data will be adopted by the accountancy profession is uncertain. This report, however, identifies those within the profession at the forefront of exploring big data, and through them we can see a glimpse of the future.



Ng Boon Yew FCCA
Executive chairman

Executive summary

Big data can offer accountants and finance professionals the possibility of reinvention, the chance to take a more strategic, 'future-facing' role in organisations.

The transition, however, will not be easy.

The accountants and finance professionals who differentiate themselves will be those who develop new skills and new ways of thinking, and who form new collaborations and partnerships.

The vast amount of data continually collected, stored and transferred by technologies is changing the priorities of businesses and posing important questions for their leaders. How can diverse, disparate and often amorphous datasets be managed profitably and responsibly?

Get big data right and it will facilitate ways of improving performance and productivity, and creating new wealth for shareholders and stakeholders. Get it wrong and the result will be poor decisions, breaches to data security and privacy codes, damage to organisational reputation and brand, and destroyed value.

Data management is becoming a business-critical function as leaders

seek ways to use the resource of big data strategically and unlock the insights that transform companies – without threatening their relationships with customers or exposing themselves to unacceptable risks. The market for big data analytics is, unsurprisingly, growing rapidly, forecast to reach US\$23bn by 2016 (IDC 2013).

The open-source software movement and the software industry have developed solutions such as new programming models and new suites of data tools.¹ Combined with increases in processing power, these solutions make it possible to synthesise vast amounts of information with previously unimaginable speed and accuracy, but they are only part of the answer.

Managing big data effectively requires the right people.

This has far-reaching implications for the accountancy and finance professions.

In this report, ACCA and the Institute of Management Accountants (IMA) carried out a desk-based review of literature published on big data, and convened three roundtables with leading accountancy and finance professionals to consider the future implications of big data for the profession. This was supplemented by a series of expert interviews with big data practitioners and early-adopter accountancy and finance professionals.

This report examines in unprecedented depth the opportunities and challenges big data presents the accountancy and finance profession over the next 5 to 10 years.

OPPORTUNITIES AND CHALLENGES

The paradox of new technology is that it offers the chance to replace the value lost as it commoditises traditional skills. Advances in automation, such as self-service data retrieval, are freeing accountants and the finance function from the more routine aspects of internal reporting and compliance work – and creating opportunities for them to alter their profile in business radically.

Trained to gather, analyse and benchmark information and to use data in modelling and forecasting, accountants and finance professionals can provide a new and critical service: making big data smaller, 'distilling' vast amounts of information into actionable insights. Responsible for the 'integrity' of reports and accounts, they can help act as custodians of non-financial datasets and set quality and ethical standards for the information used in making strategic decisions and for that sold to third parties. This role will become increasingly important as more companies look for ways of developing new products and services from data they generate and own, particularly within the context of growing concerns around privacy and ethical data usage.

Big data offers the finance professional the possibility of moving into a more strategic, proactive role in business. It is important, however, to understand the realities of what it means: the opportunities are matched by the challenges.

To differentiate themselves in the marketplace in the next 5 to 10 years and turn big data to their advantage,

1. The open-source movement is based on the idea that programming source codes should be shared. The Apache Hadoop framework, one of the best-known big data solutions, was developed by an open-source community.

accountants and finance professionals will need to do three things.

- Develop methods and services for the valuation of data – and extend their role in compliance and internal control to the ethical and effective stewardship of data assets.
- Use big data to offer more specialised decision-making support – often in real time – and decide when data can most usefully be shared with internal and external stakeholders or ‘monetised’ as new products.
- Use big data and its associated tools not only to identify risks in real time and improve forensic accounting but also to evaluate the risks and rewards of long-term investment in new products and new markets.

A NEW PROFESSIONAL AGENDA

The opportunities and challenges suggest three imperatives in the next 10 years, ie those of:

- developing new metrics
- learning new analytical skills
- creating a visual language of data ‘art’.

Combined, these imperatives make up a new professional agenda.

Accountants and finance professionals must find ways not only to measure big data as an organisational asset but also to use it as a measure of organisational performance. The trend towards integrated reporting (IR) and the inclusion of non-financial ‘capitals’ in company reports and accounts makes adopting this approach all the more urgent. It will increasingly be necessary to combine ‘hard’ financial data with ‘softer’ and non-financial datasets to provide the bigger picture of performance.

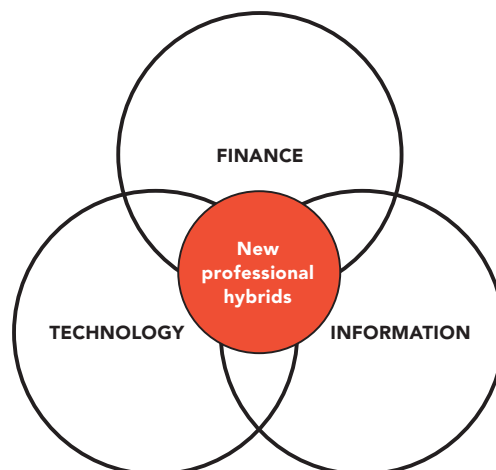
Meanwhile, there will also be requirements to extract value from big data through advanced analytics – and to interpret the meaning of big data in ‘visual language’ that can be used in company dashboards, decision-making ‘cockpits’ and information ‘hubs’.

The accountants and finance professionals who succeed in the future will form a bridge between data science and data art, combining analytical skills and sophisticated models developed by mathematicians and statisticians with the skills of data art and data ‘storytelling’.

They will collaborate closely with the IT and information management departments in cross-functional and multidisciplinary teams: the future could see the emergence of a new professional ‘hybrid’, the chief financial technology officer (CFTO) or chief financial information officer (CFIO).

Most importantly, they will form partnerships with senior leaders in the development of strategy and the management of risk – and provide a service critical to the future of business.

Figure ES1: New accounting and finance professional hybrids



1. Introduction

Big data has become a business buzzword. Its promise and its pitfalls are gaining increasing attention in businesses across the world, as business leaders come to terms with the risks and opportunities it will mean for them.

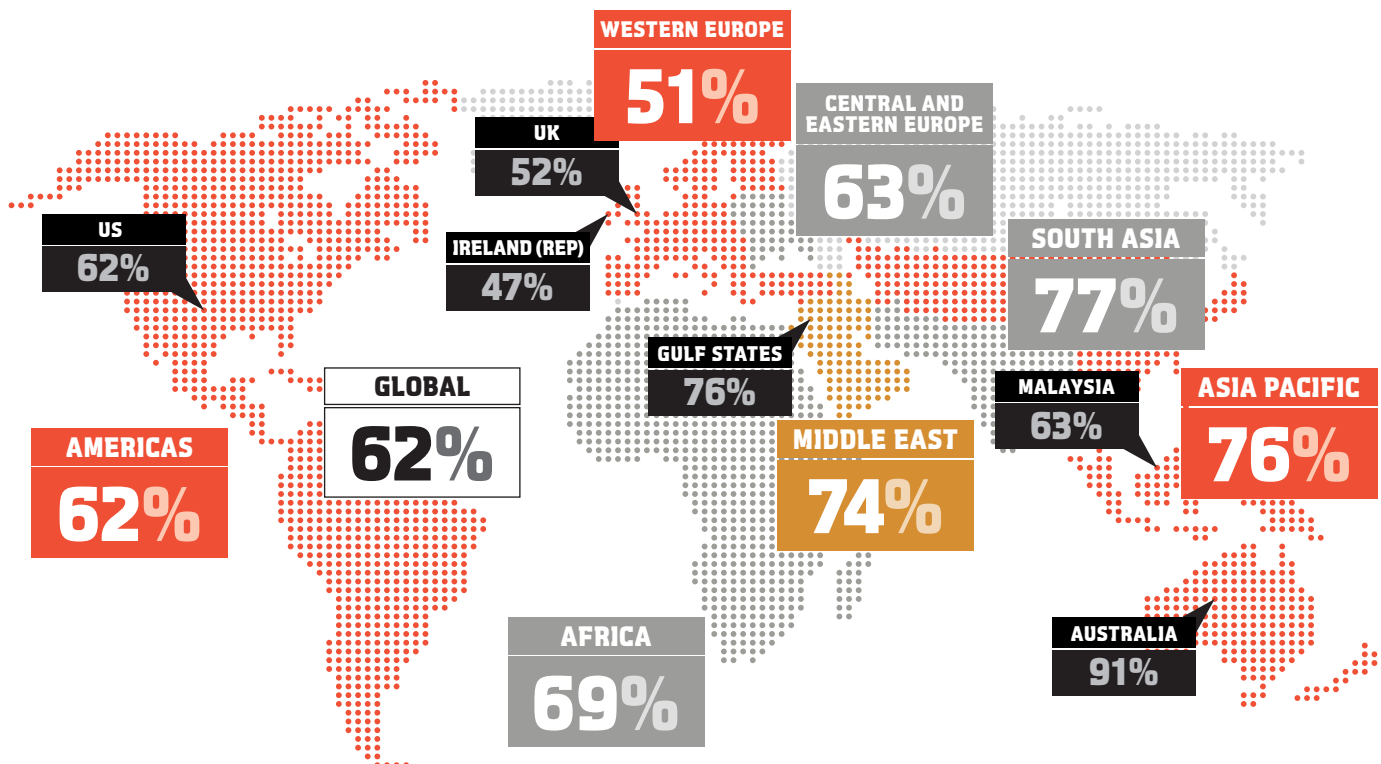
The amount of data that is generated and stored is increasing rapidly, even exponentially. It may be doubling every two years, according to one estimate (IDC 2011). At the same time, new advanced analytical techniques allow practitioners to connect and interrogate datasets that were once separate, if they existed as data at all.

The combination of new data and new analytics is aligning with other deep shifts in the way that companies work, transforming the business landscape. Organisations are becoming more flexible, more fluid, more open: they are becoming creatures of increasing complexity.

As business is transformed by the impact of big data and big data analytics, so the role of finance professionals will change as well. Some skills that were once valued will become commoditised, as has already happened in other professions. Other skills that were previously misunderstood or overlooked could become more valued. In other words, as big data accelerates the process by which business reimagines itself, so the accountancy and finance professions will have to start to reinvent themselves.

The people who can see the patterns in the data, and who are able to translate

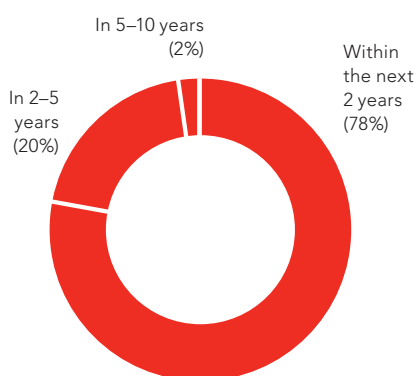
Figure 1.1: The impact of big data on business over the next 5 to 10 years



them into compelling strategic stories, will find themselves at the heart of 21st-century business.

Accountants and finance professionals have already spotted the potential of big data. In the 2012–13 ACCA–IMA technology trends survey, 78% of respondents said that they expect widespread adoption of big data within the next two years (ACCA and IMA 2013). The same survey identified big data as the second most impactful technology trend in terms of its potential to significantly reshape the business and accountancy landscape (see Figure 1.1 for scores by region).

Figure 1.2: Expectation of widespread adoption of big data



Achieving widespread adoption in the profession will demand new capabilities, new metrics and new ways of thinking.

New types of data will throw up new challenges as well: over the next decade, new standards for measuring and valuing data will be developed, with the inclusion of new and more diverse datasets in reporting, modelling and forecasting. There are less measurable issues too, such as those concerning ethics and privacy. The debate about the impact and implications of these has barely begun – but getting them wrong could prove to be explosive.

This report, then, sets out to give a balanced picture of the impact of big data on the accountancy and finance professions in the coming 5 to 10 years. It is framed by the question, ‘How will big data affect businesses over the next 5 to 10 years, and what opportunities and challenges will it create for the accountancy profession?’ As a piece of ‘futures thinking’, it does not claim to predict the future. Instead, it identifies and explores the big data trends likely to affect the accountancy professions globally in the coming years.

The research was jointly commissioned by ACCA’s Accountancy Futures Academy and the IMA, and carried out by The Futures Company. It draws on extensive international consultation with experts both inside and outside the accountancy profession.

METHODOLOGY

The research was carried out in three stages. The first, after an initial period of desk research and a review of existing evidence, involved the development of a series of hypotheses about what big data means for the future, supplemented by interviews with experts.

In the second stage, these hypotheses were tested in workshops attended by big data experts, accountants and finance professionals, and held in London and Singapore and (online) in the US.

In the final stage, evidence and insights were brought together – to identify the key drivers of change and the key themes for this report.

The report has four chapters. The first chapter provides an introduction to big data, chapter 2 defines big data and the future of business, chapter 3 sets out specific opportunities and challenges for the accountancy and finance professions. The last chapter identifies some of the actions these professions will need to take to ensure their continuing value and relevance.

2. Big data and the future of business

Big data has the potential to transform almost every aspect of business – from research and development to sales and marketing and supply-chain management – and to provide new opportunities for growth.

Nonetheless, the benefits will not be easily won. Datasets can destroy as well as create value. They need to be effectively and expertly managed, and they require significant investment from companies.

This section examines the risks and rewards of big data in business.

WHAT IS BIG DATA?

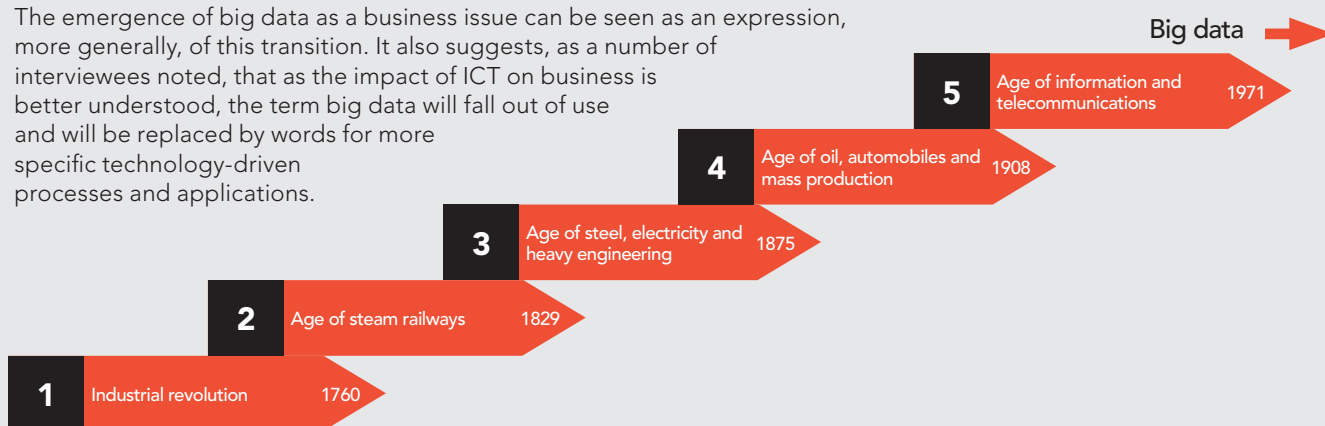
Any analysis of the impact of big data needs to start by defining what big data means. The term is commonly used, but not commonly understood. It refers primarily to the vast amount of data continually collected through devices and technologies such as credit cards and customer loyalty cards, the internet and social media and, increasingly, WiFi sensors and electronic tags. Much of this data is unstructured – data that does not conform to a specific, pre-defined data model.

BOX 2.1: BIG DATA AND TECHNOLOGY REVOLUTIONS

The impact of big data on business is part of a deeper and more fundamental shift. Drawing on the work of Carlota Perez, the technology and economic historian, one can identify a series of long-term (50–60 year) technology waves since the industrial revolution, from canals and cotton in the late 18th century, through rail, steam, electricity, steel, oil, and cars at the start of the 20th century, and information and communications technologies towards the end of it: a wave that is continuing.

Perez observes that existing businesses need to integrate the technologies of the latest wave if they are to remain competitive. Typically, this involves a process of business transformation. So, to take the example of the retail sector, the department store was the creation of the third wave (electricity, steel and chemicals). During the fourth wave (oil and cars) retailing shifted to edge-of-town sites and road-based distribution. Now, in response to the fifth wave (information and communications technology), retailing is being transformed by the application of digital technologies, both in how it engages with customers and in the way that stock is managed, monitored, and distributed.

The emergence of big data as a business issue can be seen as an expression, more generally, of this transition. It also suggests, as a number of interviewees noted, that as the impact of ICT on business is better understood, the term big data will fall out of use and will be replaced by words for more specific technology-driven processes and applications.



Big data is a kind of euphemism, a deliberately naive shorthand for datasets so vast, so complex and so dynamic they cannot be managed by standard software such as Microsoft Excel.

'We're seeing data that is different from what we would call ordinary, or server-type data. Big data for us is really a collection of datasets so large and complex that you simply can't use the existing database to manage it.'

(ASHTON DALLSINGH FCCA, VICE PRESIDENT AND CFO – EMEA AND RUSSIA, CISCO)

Gartner, the US information technology research specialist and consultancy, first developed a model for big data as long ago as 2001. Its '3V' model encompassed 'volume, velocity and variety'.

Gartner formalised its definition in 2012: 'Big data are high volume, high velocity, and/or high variety information assets that require new forms of processing to enable enhanced decision making, insight discovery and process optimization' (Gartner 2012a).

There are other, less formal definitions, too. Big data has also become shorthand for the technologies and analytical tools that help manage and interrogate it. Recent years have seen the development of big-data programming models and software such as MapReduce and Apache Hadoop. Inseparable from big data, these systems and solutions are now almost synonymous with it.

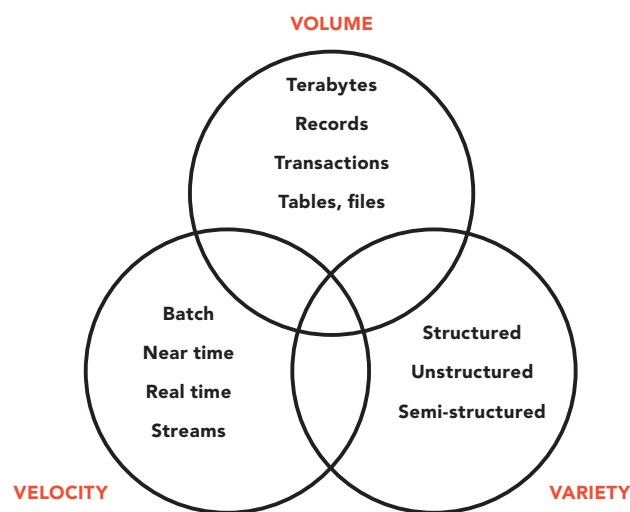
Over the next decade, the volume, velocity and variety of data are likely to

continue growing. As big data becomes mainstream, it is likely that new defining characteristics will appear once its sheer size becomes 'normal'.

'We are at an important nexus point with respect to big data, and I strongly believe it will simply become data in the very near future.'

(BRAD MONTERIO, MANAGING DIRECTOR, COLCOMGROUP INC)

Figure 2.1: The '3V' model of big data



Source: Exist.com 2013.

THE BIG DATA BOOM

As can be seen from Gartner's definition, big data has the potential to add value. Companies are using business intelligence and data mining tools to improve efficiency, spot new opportunities, provide customers with better products and services, and predict future patterns of behaviour. Unsurprisingly, the word 'value' is now being touted as a new 'V' in Gartner's model.

The opportunities are not exclusive to big business. Online and cloud-based platforms, such as Google Analytics and Tableau, mean that small and medium-sized enterprises (SMEs) can unlock insights from big data without making substantial capital investments. Unencumbered by large legacy systems, these businesses are sometimes able to leapfrog 'old tech' and start with big data almost from the outset.

The business potential is so great that big data is now often described as the 'new oil', the informational equivalent of the natural resource that shaped economies in the 19th and 20th centuries.

This analogy has some value, but it is flawed. Unlike oil, big data is in almost unlimited supply and 'renewable'. It grows in volume each year, and by orders of magnitude. Ten years ago, people talked of gigabytes of data; now they talk of terabytes, a thousand times bigger.

Key to the continued growth of data volume over the next 10 years is the so-called 'internet of things', also referred to as the 'internet of everything' (IoE). New technologies – for example, radio frequency identification (RFID)² and near-field communication (NFC)³ – are increasingly connecting objects to the internet and allowing information to pass between them. New York market intelligence firm ABI Research predicts that more than 30 billion devices will be wirelessly connected to the internet by 2020 (ABI Research 2013).

WHAT MAKES BIG DATA DIFFERENT?

The idea that data is growing in volume is, of course, nothing new. It has been a recurring theme since the term 'information explosion' was first used in 1941. Many companies have been handling large datasets for years. When mass retailer Tesco rolled out its Clubcard loyalty scheme in the UK in the mid-1990s, Lord MacLaurin, then chairman, memorably remarked that computer scientists and data analysts at Dunhumby, the customer-science company that set up the scheme, knew more about his customers after three months than he did after 30 years.

The current 'explosion' is different, though. This is not just because it involves data that is much more likely to lack 'form' and to fall outside traditional relational databases; it is also because it has been accompanied by the development of advanced analytics that allow organisations to unlock insights from data with previously unachievable speed and accuracy.

When people in business think of big data they think, to return to Gartner's definition, of velocity as well as volume and variety. Big data is fast data: it is collected quickly, transferred quickly and processed quickly.

2. Radio-frequency identification (RFID) is an electronic tagging system that uses tiny wireless tags to transfer data via radio-frequency fields. RFID tags are used in industry to track objects and products and in agriculture to track livestock.

3. Near-field communication (NFC) enables radio communication between smart phones and similar devices in close proximity to each other. It is the 'enabling' technology for contactless payment.

WHAT BIG DATA MEANS FOR BUSINESS

Analysis of big data allows organisations to see beyond historical data and to 'scan' the environment for emerging trends. Consequently, it has the potential to transform the cost and effectiveness of processes such as new-product development, market targeting and pricing.

Refined and distilled into actionable insight, broken down so it can be mapped to granular decision-making processes, it becomes both a commercial and a strategic-planning tool.

'At the franchise level of McDonald's, they are more interested in their daily results and how many customers come through the store than they are in their financial statements, because these key indicators help them act today rather than at the end of the month.'

(GARY BOOMER CPA, CEO, BOOMER CONSULTING)

Information is not just a tool, however: it is a business opportunity in its own right. This is most clearly seen in the trend to develop new products and services from proprietary data.⁴ Companies are selling their own data to create new revenue streams.

'The data you have about your customers, the markets, even the external data that you buy...when it is combined it becomes unique to your organisation and can therefore act as a sustainable competitive advantage.'

(KEVIN LONG FCA, BUSINESS DEVELOPMENT DIRECTOR, TERADATA)

Nonetheless, the business potential has its limits. Big data is a liability as well as an asset. There are many reasons why this is so.

- Data depreciates in value and can be worth less tomorrow than it is today. The greater the speed of data collection, the faster, in some cases at least, the rate of data obsolescence.
- Extracting its value may be difficult or expensive, depending on skills or technologies not readily available to the organisation. According to one estimate, the US could face a shortage of 190,000 people with the skills needed to analyse big data by 2018 (McKinsey Global Institute 2011).
- As more companies and industries make use of big data, its competitive advantages will diminish. There will probably be a race to unlock value from 'dark data' – data that is collected but unused.

- Data collection and use are coming under increased scrutiny and are subject to laws and regulations that vary by region and country.
- In the competitive race to extract more and new value, there will be a growing focus on developing sophisticated analytics that can go beyond what everyone else sees. Gartner forecasts that 'predictive algorithms' will distinguish the leading organisations of the future (Gartner 2012b). In other words, competition for skills will further increase, potentially leading to a 'big data divide' in business.

Big data, it is clear, needs to be actively managed if it is to provide profitable solutions for companies.

4. Proprietary data is internally generated data owned by an organisation.

3. Big data and the future of accountancy: opportunities and challenges

The increased demand for high-level analytic skills creates important opportunities for accountants and finance professionals.

Trained to structure, gather and analyse financial information, accountants and finance professionals can apply their core skills to non-financial and other datasets – and, crucially, help make big data smaller and more structured.

The increase in the value they bring to organisations could, therefore, be dramatic. There could, in the next 5 to 10 years, be a qualitative change that sees the finance department develop from a service function to a business-critical service, central to strategic decision making.

The management of big data for accountants and finance professionals means more than ‘game-changing’ opportunities. It means new challenges. The future is not just about a ‘straight’ transference of skills: it is about the development of new ones. Accountants

and finance professionals will need to find ways to use big data to measure organisational performance and both organisational and investment risks. In addition, as the importance of big data in business grows, they will need to find ways to measure its intrinsic value as an organisational asset.

This section examines the implications of big data for the accountancy and finance professions in detail. It covers three areas:

1. valuation of data assets
2. use of big data in decision making
3. use of big data in the management of risk.

The opportunities and challenges of each of these areas overlap but they are separated and summarised in Table 3.1.

Table 3.1: Summary of the opportunities and challenges big data presents the accountancy and finance profession

Area	Opportunity	Challenge
1. Valuation of data assets	<p>Helping companies value their data assets through the development of robust valuation methodologies</p> <p>Increasing the value of data through stewardship and quality control</p>	<p>Big data can quickly ‘decay’ in value as new data becomes available</p> <p>The value of data varies according to its use</p> <p>Uncertainty about future developments in regulation, global governance and privacy rights and what they might mean for data value</p>
2. Use of big data in decision making	<p>Using big data to offer more specialised decision-making support in real time</p> <p>Working in partnership with other departments to calculate the points at which big data can most usefully be shared with internal and external stakeholders</p>	<p>Self-service and automation could erode the need for standard internal reporting</p> <p>Cultural barriers might obstruct data sharing between silos and across organisational boundaries</p>
3. Use of big data in the management of risk	<p>Expanding the data resources used in risk forecasting to see the bigger picture</p> <p>Identifying risks in real-time for fraud detection and forensic accounting</p> <p>Using predictive analytics to test the risk of longer-term investment opportunities in new markets and products</p>	<p>Ensuring that correlation is not confused with causation when using diverse data sources and big data analytics to identify risks</p> <p>Predictive analytic techniques will mean changes to budgeting and return on investment calculations</p> <p>Finding ways to factor failure-based learning from rapid experimentation techniques into processes, budgets and capital allocation</p>

AREA 1: VALUATION OF DATA ASSETS

The growing importance of big data as a company asset is driving the development of new ways to value data assets.

The internet and the spread of mobile and smart technologies have radically altered the profile and visibility of data in business.

Data is increasingly used to drive operating efficiencies. Some of the benefits are clearly seen in the retail sector, where real-time analytics are helping companies keep pace with customer demand and reduce logistics and distribution costs. New York fashion brand Elie Tahari, for example, is now using sales data to predict global demand for each of its products four months in advance (IBM 2012). The granularity of these predictions is striking: the company, thanks to big data and its associated tools, is able to see which sizes and which colourways are selling out fastest, in which stores and in which regions.

Big data is more than a business tool used for competitive advantage. For a growing number of companies, in a growing number of sectors, it is also a business plan or a business model.

Profits are now being built on big data. Internet companies such as Google have pioneered the monetisation of big data – and other companies, in other sectors, are following their lead. The Spanish

multinational telecoms carrier Telefónica, for example, recently set up a new global division, Dynamic Insights, that uses the company's own repository of customer data to create new services and new revenue streams (Telefónica 2012).

As wireless technologies and the IoE further expand the volume and variety of data, opportunities to convert big data into value will grow – in the short term at least.

Over the next 10 years, therefore, data will become an important source of wealth creation – and will, increasingly, be seen as a business asset that has to be valued and may need to be accounted for.

HELPING COMPANIES VALUE THEIR DATA ASSETS

The key concept here is that accountants and finance professionals who develop metrics for big data could differentiate themselves in the marketplace.

Recent research has found that 20% of large companies already class data as an asset on their balance sheets – and that for companies with more than 10,000 employees, the figure rises to 30% (Dynamic Markets 2012). Providing data valuation services could be a significant opportunity – and an important differentiator – for accountants in the future.

'I see data as an asset, definitely. As an asset type, it's not very different from a brand.'

(ANGIE LIM CA, CFO, ASIA-PACIFIC – INTERNATIONAL DIRECTOR, JONES LANG LASALLE)

Yet valuing data is fraught with difficulty. Intangible assets, increasingly important in the knowledge economy, tend to get hidden in reporting and governance systems developed for the industrial age. Even when it is visible, data is not easy to measure. The first challenge is the problem of depreciation, highlighted in the previous section. Increases in velocity mean increases in the rate of obsolescence: the value of old data can quickly 'decay' as new data becomes available.

A related problem is that the value of data varies according to its relevance, and that its relevance varies according to who uses it. How do you measure the commercial value of a dataset objectively? Data that is worth little to one group of people might be useful to another.

These problems are likely to be resolved as markets for datasets develop, gaining depth and liquidity, and as expertise and knowledge grow, but other uncertainties surround big data. As the previous section suggested, these include issues such as regulation, global

governance and privacy rights – and they could, according to the World Economic Forum, materially affect the economic value of big data and the investments that companies make in it (World Economic Forum 2011).

In order to value big data assets, accountants and finance professionals will need to identify what data is of value, select an accepted valuation methodology and determine key assumptions.

'Data is like food. It has a shelf life and a use-by date. Some types of data have a longer shelf life than others.'

(ALEX STEER, SENIOR STRATEGIST, FABRIC WORLDWIDE)



SPOTLIGHT ON SANDRA B. RICHTERMEYER
CMA, CPA
Professor and chair, department of accountancy at Xavier University



VALUING BIG DATA: PROBLEMS AND SOLUTIONS

Different datasets require different levels of investment and, consequently, have different values. Routine, highly structured data is, for example, generated more easily and more simply than qualitative and risk-analysis data gathered on new export markets.

The 'problem' of big data in accountancy, however, may be exaggerated. Certain principles for valuing intangible assets will apply.

'Profits or cash flows can be linked with investments in initiatives that may be regarded as using big data', says Richtermeier. 'Time and resources spent generating big data capabilities may be appropriately capitalised and valued similarly to the way custom software or other custom technology is.'

What is more, it is important to remember that data is not just something that has to be measured but is also a metric in its own right. Seen like this, it is an accountancy tool.

'It can give a more comprehensive view of the performance of other intangibles such as customer lists, custom technology, marketing rights, certifications, licences, to name a few', Richtermeier continues.

'More specifically, more complex integrated data linked to these types of intangible asset can help show the return on investment (ROI) or benefits of these types of asset.'



SPOTLIGHT ON NINA TAN CPA, ACCA
CFO of Trax Technology Solutions
Pte Ltd



WHAT'S DATA WORTH?

Nina Tan is chief finance officer of Trax Technology Solutions, a company that captures retail data through image recognition technology to provide reports to fast moving consumers goods (FMCG) retailers and their sales representatives in real time. Its solutions turn photographs of products, into data that shows how these products are performing against key performance indicators (KPIs).

'The valuation of data assets is still in an exploratory stage,' says Tan. 'The learning that I would share with fellow accountants is adopted from Steve Job's statement: "a person should stay hungry and stay foolish."'

'Some of the previous methods that the profession has developed in valuation or auditing are good grounding guidelines, but we need to open our minds, evolve with technology and see how we can modify and adapt to add value as strategic partners to the business entity. In order to do that, we've got to stay hungry for knowledge, experience and exposure, and stay foolish in our humility, be open to new ideas and move with the times so that we can play a part in growing businesses.'

'Developing the pricing strategy of big data products is something that CFOs should get involved with.'

Box 3.1: Data valuation: legal and ethical uncertainties

As new digital technologies lead to the collection, storage and trading of personal data on an unprecedented scale, people are starting to see the transfer of data between them and companies as a 'one-sided handshake' over which they have little control.

Recent privacy controversies such as the Edward Snowden affair have fuelled concerns, and further alerted consumers to the dangers of data misuse.

As yet, however, a consistent global framework for regulating data privacy has still to emerge. This means that data valuations may need to be 'adjusted' for particular market conditions – and according to whether a company operates in a 'data economy'.

The position varies both between and within regions. Some EU member states, for example, interpret regulations such as the e-Privacy Directive differently. A good example is the Netherlands, which has recently relaxed its policy on cookies (Loerke 2013). It is unclear what impact this will have on the type of value that can be extracted, but it could mean that data generated in the Netherlands increases not only in volume, but also in economic value.

There are other, less obvious, ethical and legal questions. Given trends in health regulation, for example, could retailers be held liable if they are seen to reward customers for repeat purchases of unhealthy foods? What is the pressure on companies to use data responsibly – and what does it mean for data valuation?

INCREASING THE VALUE OF DATA THROUGH STEWARDSHIP AND QUALITY CONTROL

The key concept here is that accountants and finance professionals can help make internal datasets more secure and robust – and more valuable and marketable.

Accountants' and finance professionals' role in compliance is likely to change significantly and be re-defined in the next 5 to 10 years. It will extend beyond 'policing' financial data and accounts to 'stewarding' all the data in the company's asset base. Accountants and finance professionals will not only ensure that data complies with regulation but also that it meets their own and the organisation's 'quality assurance' standards.

In larger and multinational organisations, this new stewardship role could include helping to manage the transition from legacy systems to big data systems and working closely with IT and information management departments to combine disparate internal datasets effectively. This is particularly important given the growing demand for real-time information and the difficulties associated with drawing the right data at the right moment from legacy systems.

Central to the role will be helping to build trust in the quality and provenance of data among both internal and external stakeholders.

Accountants and finance professionals are increasingly likely to work with CIOs to ensure that the data used in making critical decisions is robust and from reliable sources.

They are also increasingly likely to help in preparing company data for external use. Some CFOs have started laying the



SPOTLIGHT ON IAN BETTS FCCA
Data manager, upstream, projects and technology at Shell



DATA MANAGEMENT: THE FINANCE FUNCTION'S NEW ROLE?

Shell has embedded leading edge data quality assurance into a wide range of finance and other business processes spanning its complex upstream and downstream businesses. This reflects an emphasis on quality before quantity.

Data quality assurance is a key enabler for Shell's drive for operational excellence – a process is only as good as the data it uses. Moreover, with the big data 'revolution', there is a growing impetus to ensure the company's data is 'fit for purpose' and can enable effective business performance management.

To achieve world class performance Shell has centralised data quality assurance activities for its high value data – a new role has emerged for the finance function as the assurance provider for data quality across a wide range of critical data (both financial and non-financial). Data managers within finance now drive the development of data quality controls, working with business partners to identify critical data and implement effective controls and reporting mechanisms to ensure that changes to this data are made 'right-first-time'.

According to Shell's upstream data manager, Ian Betts, this has been a natural evolution of the role of finance. 'In Shell we are moving towards managing information and data in an ever more integrated way. This requires control and assurance skills that sit naturally with the finance function', he says.

'A key part of our role is to explain the value of good quality data for all of our business processes and inspire people to invest time in driving improving. We work on the basis that correcting a data error costs about 10 times as much as getting it right first time. Our vision is for the finance function to provide efficient and effective data quality assurance that unlocks business value at appropriate cost'.

foundation for the monetisation of data by setting performance targets and key performance indicators (KPIs) for data quality.

As public concern about the misuse of personal data grows, quality assurance must include standards for data privacy and data security. Privacy and security

breaches will have huge costs to an organisation's reputation.

Sensitive use of data will be critical. People might, for example, believe that they are being discriminated against if data collected on their behaviour is used to predict their credit risks (see the Canadian Tire example, page 23).

AREA 2: USE OF BIG DATA IN DECISION MAKING

The growing volume of both structured and unstructured information, combined with more sophisticated analytical tools, has enabled the development of more data-driven forms of decision making.

The facilitation of better decision making is identified as one of the greatest benefits of big data. In a survey by Tata Consulting Services, 80% of businesses said that implementing big data initiatives had improved their decision making (Tata Consultancy Services 2013), and companies increasingly appear to be using data to inform discussions about developing new products and services and how to interact with customers, employees and stakeholders (PwC 2013).

Nonetheless, the role of big data in the decision-making process needs to be viewed with caution. The problem of rapid obsolescence means there is a risk of basing decisions on out-of-date information. According to IDG Research Services, only one in ten business leaders say that big data solutions are effective at getting important information to their workers in a timely fashion (Information Week 2013).

There are also concerns that people will forget that data-led decisions still involve interpretation and judgement, and make poor decisions as a result (Crawford 2013). As American statistician and writer, Nate Silver argues, 'Data-driven predictions can succeed – and they can fail...Unless we become aware of the biases we introduce, the returns to additional information may be minimal – or diminishing' (Silver 2013).

On a practical level, there is also the continuing problem of dataset accessibility and interrogation. Data discovery tools such as Tableau and Qwikview now allow staff who are not very technically skilled to make diagnostic analyses on the basis of their own explorations of data, but for many organisations deep data analysis remains the domain of the specialist (Capgemini 2013).

This creates a significant opportunity for the accountancy profession to support companies in the business-critical use of data. Trained to gather, analyse and benchmark data, accountants and finance professionals can apply their core skills to the strategic use of big data. The next 5 to 10 years could see them finally shed their 'backroom' image and take a central and more proactive role in value creation.

'As technologies allow businesses to very securely capture, store and analyse increasing volumes of data from increasingly diverse sources, accountants that can help extract the right information from data and make it easily available to people in their organisation at the right time will create a competitive advantage.'

(AGATA WATERLOOS FCCA, CFO, MICROSOFT SLOVAKIA)

USING BIG DATA TO OFFER MORE SPECIALISED DECISION-MAKING SUPPORT IN REAL TIME

The key concept here is that the spread of self-service data retrieval will change the services that accountants provide – and their relationships with company decision makers.

The rise of big data has coincided with other technological advances that have dramatically reduced response times and significantly increased the scope for real-time decision making. Companies can now access and process the information they need to make decisions at speeds that were unimaginable 10 years ago.

This is neatly illustrated by the example of an Asian bank that, according to a PwC case study, analysed a portfolio of 30 million complex cash flow instruments across 50,000 different scenarios in under eight hours. Before advances in big data and advanced processing power, the same task, says Sundara Raj, consulting leader for PwC in Malaysia, would have taken weeks.

For accountants and finance professionals, such advances are something of a paradox. On the one hand, they pose the risk that the value created by the finance function will be eroded; on the other, they create opportunities to replace the value lost. As automation and self-service data retrieval 'take over' some of their traditional roles in internal reporting, accountants and finance professionals are left freer for more strategic work. They can turn big data to their advantage to offer more specialised support.



SPOTLIGHT ON ASHTON DALLSINGH FCCA
Vice president and CFO, EMEA and Russia,
Cisco



THE INTERNET OF EVERYTHING: ACCOUNTANCY'S BIG OPPORTUNITY

Cisco estimates that 50bn devices will be connected to the internet by 2020. This increasingly rapid rise in data traffic creates a 'fundamental paradigm shift' for accountants and finance professionals, according to Ashton Dallsingh.

'There are three opportunities', he says. 'The first is in structuring data. Most of the growth in data will be unstructured, so bringing structure to it is a massive opportunity for the profession.'

'The second is in driving productivity. Leveraging big data is a critical part of the equation of how companies execute their enterprise strategy and gain competitive advantage, and finance professionals could play a major part.'

'Thirdly, there is the opportunity for finance professionals to become thought leaders. The finance leader should be able to sit at the boardroom table without a computer or spreadsheet and have a conversation about trends and technologies and the strategic direction of the enterprise. There is a difference between information and wisdom, and as the profession evolves we are moving into the wisdom sphere.'

This last opportunity is the most 'game-changing'. Exploiting it, however, requires work. Dallsingh concludes: 'Finance teams need to keep abreast of where technology is going, relative to their industry and company.'

'The self-service concept is really going to push what value the finance professionals are providing today and how it will change tomorrow. The large companies are really moving towards self-service, but even the smaller, mid-sized companies will have similar dashboards. I think we're going to have to analyse what services we're going to deliver as finance professionals beyond accounting and governance.'

(AMBER ARNHOLD CMA, SENIOR FINANCE MANAGER, HONEYWELL).

Rather than just presenting financial data, the role of the accountant of the future could, for example, be to identify the options available to decision makers by analysis of different datasets. It will, of course, be important for accountants to align the provision of their decision-making support with business cycles. What is 'real time' varies both between and within organisations: a web-based company such as Amazon will think of it differently from a packaged goods company; a sales team will hold a different view from an R&D department.

CREATING VALUE THROUGH DATA SHARING

The key concept here is that accountants and finance departments can improve the flow of data both inside and outside organisations, saving time and money and increasing efficiency.

Accountants and finance professionals can help maximise the value of data by determining the points at which it can most usefully be shared with internal and external shareholders. Timely exchange of data between departmental silos can, for example, improve consistency and clarity and avoid situations where decision makers get different answers to the same question, or analyse the same question twice.

As the guardians of a company's assets, accountants and finance professionals may balk at the idea of external data exchange. In practice, as organisational boundaries shift and blur, in future there is likely to be greater awareness that distributed knowledge can create, not erode, competitive advantage. With the rise of the open data movement, this distribution could increasingly involve a company's customers.

Already, companies such as P&G and Walmart are sharing data across their supply chains in order to improve efficiency.



SPOTLIGHT ON HARVEY LEWIS
Research director, Deloitte

Deloitte.

OPEN DATA: THE ULTIMATE IN DATA SHARING?

Over the past 15 to 20 years, 'open data' has developed into a movement, founded on the idea that information is a common resource that should be shared. Public administrations from US to France and Kenya to Singapore have started making government datasets accessible to citizens and developers. More recently, businesses have started to explore the commercial benefits of open data and data sharing.

What might these commercial benefits be? The most obvious, perhaps, is access to the (scarce) skills and resources needed to unlock the insights for innovation. By opening their data on platforms such as Kaggle (which allows the world's 'data miners' to compete to design the best models), companies can 'leverage' the analytic power of the crowd.

Crowdsourcing platforms are not the only access point, of course. Several organisations, including online retailers, have created application programming interfaces (APIs) that allow developers to build apps that the companies can then use to market and sell their products better.

Harvey Lewis says: 'I think we are going to see traditional companies, which have built their entire industry on selling proprietary data, overtaken by smaller, nimbler and more open competitors. Large businesses, too, which are struggling to manage their data, may decide to open up because turning to the external community can be a very cost-effective and innovative way of unlocking insight.'

The accountancy profession has an important role to play in helping companies make the open-data decision. Lewis continues: 'One of the key points for the accountancy profession is that you can't make any decisions about whether or not you outsource or insource your data analysis unless you understand what the value of the data is. If accountants can find a way of accurately estimating the value of data, then company boards can make better decisions about whether or not they should open it up to unlock value.'

'There's a great opportunity for accountants to work with supply chain management, look at the overall impact that sharing data has on the supply chain... Even incorporating simple supply chain management concepts in the analysis of performance measures, particularly with non-financial metrics, can help accounting professionals learn more about the advantages of big data and become more aware of its potential.'

(SANDRA RICHTERMEYER CMA, CPA, PROFESSOR OF ACCOUNTANCY, XAVIER UNIVERSITY)

By working more closely with other departments, such as purchasing, and with supply-chain managers to analyse data flows, accountants and finance professionals will help identify ways to improve performance.

There are, however, barriers to this brave new world of data exchange. One of the biggest may be cultural resistance. Departments may guard their own data for reasons such as confidentiality, fear of attracting too much scrutiny and/or of losing control over certain aspects of their activities. Accountants and the finance department may have to take the lead in forming cross-functional teams. 'Silo mentality' is the enemy of effective data management and effective integrated thinking.

AREA 3: USE OF BIG DATA IN THE MANAGEMENT OF RISK

The increased complexity of business risks is driving the use of big data in the attempt to contain them.

There is consensus among economists and business leaders that volatility will be the 'new normal' in the coming decade. Economic turbulence, resource constraints and political and social change are creating an uncertain and unstable operating environment for organisations.

Against this backdrop, the risk-management role of the finance function is developing beyond compliance and internal control. Finance professionals are increasingly concerned with the impact of external forces on enterprise performance, ranging from regulatory changes and supply-chain risks to natural disasters and threats to company reputation and brand. In addition, they are increasingly involved in assessing the risks of companies' strategies for growth, including mergers and acquisitions and entry into new and emerging markets.

The corollary is that the work of accountants and finance professionals now involves a growing number and variety of datasets. Current and predicted data and future performance are becoming as important as historic data and results.

Over the next 5 to 10 years, then, accountants and finance professionals will increasingly ask how they can leverage the resource of big data to help organisations anticipate or pre-empt risks – and protect performance.

'We are seeing enterprise risk management (ERM) and enterprise and corporate performance management (EPM/CPM) begin to merge and overlap: risk mitigation is becoming more important to CFOs taking on strategic advisory roles [in addition to] their need to budget for risk mitigation spending.'

(GARY COKINS, FOUNDER AND CEO, ANALYTICS-BASED PERFORMANCE MANAGEMENT LLC)

EXPANDING THE DATA RESOURCES USED IN RISK FORECASTING

The key concept here is that accountants and finance professionals will increasingly use big data to see the bigger picture of business risk.

Ten years ago, Canadian Tire, retailer of electronics, kitchen supplies, sporting equipment and car accessories, made a breakthrough study that linked consumer behaviour with credit risk. By detailed analysis of transactions made with its credit card, accepted by multiple outlets, it found that late payments and defaults could be predicted by the type of goods and brands people bought and the type of bar they visited. Its data indicated, for example, that anyone who purchased a chrome-skull car accessory or a Mega Thruster Exhaust System was likely to miss paying their bill eventually, and that the Sharx Pool Bar in Montreal, where 47% of patrons missed four Canadian Tire card payments over 12 months, was the 'riskiest' watering hole in Canada.

The predictions proved to be more precise than traditional industry forecasting methods. Canadian Tire subsequently decided not to use the (socially sensitive) findings to manage its own customers, but its story illustrates a key point about big data analytics: they show you a bigger picture (New York Times 2009). Accountants and finance professionals can exploit this big picture advantage. By including diverse sets of data in their calculations, they can improve identification and mitigation of risks.

In the era of big data, external sources are proving an increasingly useful and immediate risk-management tool. Social media are effectively early warning systems of shifts in both consumer sentiment and serious macroeconomic and social and political risks. News of insurgencies and natural disasters can break on Facebook and Twitter or their Chinese and Russian equivalents, Sina Weibo and VK, first.

There are, however, caveats attached to big-picture analysis and forecasting. One of the most significant is the danger of confusing causation and correlation. This danger has been amply demonstrated by Berkeley professor David Leinweber, who found that the annual closing price of the S&P 500 stock market index between 1983 and 1993 was positively correlated with the rate of butter production in Bangladesh (Leinweber 2009).

Proving causality demands more than noticing a coincidence of data trends. The risks of big data analytics must always be kept in mind.

IDENTIFYING RISKS IN REAL-TIME

The key concept here is that 'live' data streams will become vital fraud-detection and forensic-accounting tools.

Big data makes it easier for auditors to spot large-scale fraud. Negative correlations between different datasets (for example, non-financial and financial measures of business performance) could, for example, be warning signs of 'manipulation'.

The main and more immediate potential in forensic accounting and auditing, however, lies in real-time analytics and 'agile' risk identification. Testing can now be programmed into live corporate systems to provide continuous monitoring of transactions. The automation of fraud detection allows auditors to perform risk assessments in real time or near real time, helping companies to meet the increased demands of regulatory compliance.

Some early-adopter accountancy firms are even using automated pattern detection to create new commercial applications. A US company, for example, has developed a fraud-detection solution for a client concerned about theft by employees. Software automates trend analysis and gives notification of events that fall outside a given set of parameters. When the solution detects an anomaly, it automatically alerts the client.

USING PREDICTIVE ANALYTICS TO TEST THE RISK OF LONGER-TERM OPPORTUNITIES

The key concept here is that predictive models will increasingly be used to test the risks of investment in new markets and products – and accountants will increasingly be required to help maximise their value.

The field of predictive analytics combines techniques such as statistical modelling and data mining to predict events. Developed by mathematicians and statisticians, these predictive models can be used by accountants and finance managers to assess

emerging threats, and they mark a further move away from reactive, hindsight-based risk analysis.

Importantly, the opportunities for the accountancy profession include not just risk forecasting but also assessment of the longer-term viability of investment opportunities – for example, investment in new and emerging technologies. On a practical level, however, there are likely to be some challenges. Predictive analytic techniques will mean changes to budgeting and return-on-investment calculations.

Big data vendors are launching products designed specifically to enable rapid experimentation and rapid prototyping, and to allow companies to test and iteratively develop risky ideas before rolling them out.⁵

These practices are likely to evolve in parallel with innovations such as 3D printing⁶ and are based on the idea that learning from mistakes is integral to the development process. Accountants and finance managers might, therefore, need to find ways to factor failure-based learning into processes, budgets and capital allocation.

The overarching requirement and opportunity, however, lie in helping organisations to derive most value from predictive techniques.



SPOTLIGHT ON SUNDARA RAJ
Consulting leader, PwC Malaysia



DATA ANALYTICS: THE BIG PICTURE OF FRAUD DETECTION

Big data opens up the possibility of instant fraud detection and live auditing. PwC's consulting practice in Malaysia includes a forensics group specialising in big data analytics.

When asked to investigate fraud, the forensics team constructs a 'visualisation' of information from a wide variety of sources, including official documents, social media, emails and texts – and even conversations.

Through this process, accountants and finance professionals are able to see 'concentrations' of potential fraud. 'The benefit of visualising occurrences of suspected fraud is that it helps us focus on what counts,' says Sundara Raj. 'When you're dealing with a huge amount of data, visualisation helps you identify trends or anomalies that point you in the right direction for further probing.

With proper analytics tools, the impact on response times is also dramatic. Tasks involving analysis of millions of data sources that once took weeks or months now take days..

5. For example, Applied Predictive Technologies.

6. 3D printing is a new technology that transforms digital models into 3D printed objects.

4. Big data and the future of accountancy: imperatives

The impact of big data means that accountants and finance professionals are at a crossroads.

They can either do nothing and watch as advances in technology commoditise their skills and downgrade their role, or they can adapt to the new environment and increase their influence and the value they add to organisations.

The overarching requirement in the next 5 to 10 years is a new professional agenda that repositions the accountant and finance professional at the centre of organisations.

Big data is an opportunity for the accountancy and finance professions to take a more strategic role and help shape the future. Trained to gather and analyse structured and unstructured data and to model and benchmark information, accountants and the finance function can provide a new and business-critical service to senior management and boards: making big data smaller, distilling information into the insights that improve decision making and transform organisations.

If they are to move up the value chain and turn big data to their advantage, however, accountants and finance professionals will need to 'up skill' and do things differently.

The new professional agenda consists of three imperatives, ie those of:

- developing new metrics
- learning new analytical skills
- creating a visual language of data 'art'.

These imperatives, and their implications, are discussed on the following pages.

'There is an opportunity to evolve the skill set of accountancy and finance to harness the wisdom from the data. Senior leaders need to hear the wisdom and not just data. That does not mean we lose our DNA as financiers, but it's what we need to do to become the next generation of finance leaders.'

(ASHTON DALLSINGH FCCA, VICE PRESIDENT AND CFO – EMEA AND RUSSIA, CISCO)

DEVELOPING NEW METRICS

Accountants will need to develop metrics and standards for the valuation of internal data. In addition, they will need to combine different datasets to measure organisational performance and to assess and predict risks. Everything from social media comments and online product reviews to information on the quality standards, working conditions and credit and political risks of overseas markets is important to big-picture analysis. Unstructured data and data not routinely available from the enterprise system will increasingly need to be gathered and synthesised.

The requirement to combine and integrate different types of data can, of course, be seen in the context of a wider trend: integrated reporting (IR). Currently much discussed by accountants, auditors, bankers and institutional investors, IR recognises the importance of non-traditional indicators and predictors in company reports and long-term assessments – and, therefore, makes big data more important.

Box 4.1: Big data and integrated reporting

Big data makes integrated reporting more possible, that is, using both financial and non-financial information to communicate a company's performance over time.

The International Integrated Reporting Council (IIRC), set up in 2010, has proposed a reporting framework of six capitals: financial, manufacturing, intellectual, human, social and relationship, and natural.

Whether or not this framework is agreed upon, it seems certain that organisations will increasingly link diverse datasets to provide a more complete picture of their performance – both for shareholders and stakeholders. (IR is arguably only the logical extension of long-established ideas such as that of 'the triple bottom line'.)



SPOTLIGHT ON BRAD MONTERIO
Managing director, Colcomgroup Inc



BIG DATA AND THE FUTURE OF REPORTING

Organisations today collect and analyse more information from outside traditional financial reporting and enterprise resource planning (ERP) systems. Environmental, social and governance (ESG) datasets are increasingly used in 'mash-ups'⁷ and detailed analysis.

The change is largely driven by the increasing importance of sustainability and corporate social responsibility, but it is being accelerated by big data and associated technologies.

'Data formats have multiplied, data analytics tools have become more sophisticated, cloud-based platforms for hosting and processing big data have made analysis faster, more cost effective, and more manageable,' says Brad Monterio.

The result will be the transformation of company reporting. Already, the International Integrated Reporting Council has identified six capitals that affect the value of businesses (see Box 4.1).

'When you think about data surrounding something like natural capital – essentially the 'E' in ESG data – you begin to see how broad and large the data about an organisation's impact on the environment could become,' Monterio continues. 'The amount of financial information found on the balance sheet, income statement and statement of cash flows is dwarfed by the potential volume of metrics for greenhouse gas emissions, water use, forestry impact, natural resource extraction and more.'

In the future, then, accountants and finance professionals will use more diverse sets of data in models and forecasts.

'In addition to environmental data, information about the social practices of the organisation will also be valuable to accountants. Disclosures about labour practices, executive compensation, workforce demographics, hiring policies and many others will add new dimensions to a company's corporate reports and be better indicators of prospects for future growth and value creation.'

With integrated reporting comes big-picture accountancy.

⁷ 'Mash-ups' are applications that combine information from multiple sources to produce a single output.



SPOTLIGHT ON TONY LEVY
Business unit executive,
product marketing, IBM Business Analytics



BIG DATA AND THE FUTURE OF THE FINANCIAL PLANNING AND ANALYSIS FUNCTION

The data needs of accountants and finance professionals are changing. Increased volatility and uncertainty in the operating environment mean that it is no longer sufficient to deliver timely reports on historical financial performance. 'In the past, we always focused on predictable trends, but the analysis task has changed', says Tony Levy. 'We need to look at less predictable trends, we need to access more diverse data sources, and we need to invest in analytics to unlock the insight in them. 'Business as usual is no longer possible.'

For many members of the accountancy and finance professions, the challenge, according to Levy, could be considerable. 'Finance can be doing a lot more with big data and analytics than they have in the past in order to cope with increasing volatility, uncertainty and risk,' he says. 'In the next five years, it needs to mature its capabilities, from reporting and analysis of what has already happened to foresight into what will happen next.'

'The danger is that today's accountants spend 60% of their time collecting and validating data.... All that has to be retooled and upgraded, so that automation unlocks the capacity of the FP&A team [and allows it] to focus 60% of its time on delivering stronger business foresight and judgement using big data and analytics.'

For Levy, the imperative is clear: the accountant's and finance professional's role must be repositioned.

'The critical question for the CFO is whether they see their organisation as a score keeper that runs an efficient finance shop, or as an agent of performance, linking strategy to execution, delivering analyses and foresight, instilling innovation to spur profitable growth and focusing on enterprise transformation and business model innovation.

'The future of the CFO is at stake.... The CFO is in a unique position: they bring with them a discipline of performance that no one else in the organisation has. They understand the value drivers of the business, and how these support shareholder value. Only the CFO and finance function are able to connect shareholder value to the value stream of the business.'

On a practical level, the adoption of new metrics for performance will mean:

- helping leaders and managers identify non-financial measures most relevant to their organisations – at particular points in time; for example, data from social media such as Facebook, Twitter, Sina Weibo and VK could be used during a product launch to predict sales and revenue growth
- developing ways to quantify unstructured data such as 'consumer sentiment' data gathered from social media, data about the political and credit risks of new export markets and data about climate change and environmental risks and use it in forecasting models.

The latter points to the more general imperative: the need to acquire new and different skills.

LEARNING NEW ANALYTICAL SKILLS

The analytical skills of accountants and finance professionals make them particularly well qualified to analyse big data and identify the datasets that are of real value to an organisation. Developing these skills will be important over the next 5 to 10 years.

There is, as the first section of this report made clear, a widening big-data skills gap. The opportunity to help close it cannot be ignored: it could be transformative for the accountancy and finance profession.

The convergence of core accountancy skills with some of the skills of data science will open up new career paths – and, crucially, help replace the value lost as technology automates the more routine aspects of reporting work.

Moving into the domain of data science has practical implications, as the following examples show.

- It will be important to ask the right questions of the CIO and analytic functions. Databases will need to be ‘interrogated’ for the answers and insights the CEO and the organisation need. To use predictive analytics tools well, one has to know what information is needed, as the technology consultancy Forrester has recently pointed out (Forrester 2013).

- Analysis of performance trends must go deeper than previously. As companies invest in big data systems, for example, Hadoop clusters, the focus of the accountancy profession will broaden to include a more diverse range of datasets beyond financial data.
- Specialist big-data groups will be needed. Research has found that the best way to create value from big data is to form a separate, specialist group in an organisation (Tata Consultancy Services 2013).
- Working closely and regularly with the CIO and with IT staff and business-unit analysts will help pool and build knowledge.

‘We are seeing some companies start putting together centres of excellence...that different parts of the organisation can go to for help when they have a business intelligence, data discovery, big data requirement they want to attack.’

(JOHN O’ROURKE, VICE PRESIDENT OF PRODUCT MARKETING, EPM APPLICATIONS, ORACLE)

In SMEs, which will lack the resources for a dedicated function, less formal (but equally consistent) mechanisms for collaboration will be needed.

CREATING A VISUAL LANGUAGE OF DATA ‘ART’

‘Art’ could be the next big thing in big data. Big data, as Capgemini puts it, ‘operates in a cauldron of ambiguity requiring as much “data art” as “data science” to achieve continuous, incremental and actionable insight’ (Capgemini 2013a).

This means that data ‘storytelling’ could be as important a part of the big-data skills set as advanced and predictive analytics. Here again, accountants’ core skills put them at an advantage: telling the story of big data requires the ability to analyse it and to separate the essential from the marginal.

‘You need somebody who can go down, read right deep into it, and communicate [what it means].’

(VIVEKANAND GOPALKRISHNAN, DIRECTOR OF RESEARCH AND INNOVATION, DELOITTE ANALYTICS INSTITUTE (ASIA))

There will be a growing requirement for accountants and finance professionals to use statistical and analytical skills to ‘unravel’ the meaning of data and communicate that meaning to decision makers. Accountants are not software engineers or data scientists but they could, in the future, be the point at which data science and data art meet. What kind of storytelling ‘applications’ will they help develop? A good example is given in Box 4.4.

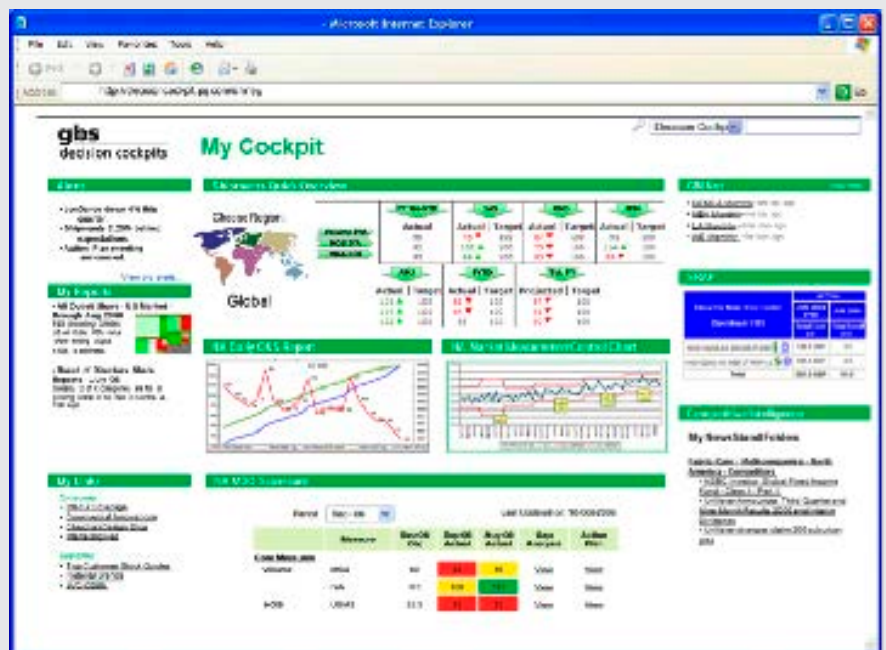
Increasingly, accountants will help decide the financial content used in ‘data visualisation’ and company dashboards – and how non-financial data should be overlaid on it. Put simply, they will be required to help create a common visual language for data.

Box 4.4: Big data visualisation, Procter & Gamble

Some companies have 'institutionalised' data art. One example is Procter & Gamble, which has put visual displays of key information on the computers of more than 50,000 employees. The company has also created meeting rooms ('business spheres') where managers can review information to improve and accelerate decision making. The spheres give people in more than 50 locations access to the same information.

The displays, known as 'decision cockpits', convey trends and comparisons in a way that is immediately accessible. One of the key visual tools is a 'heatmap' showing all the markets in a region where the company competes and the relative share of its products. The colour red on the map indicates low market share, the colour green indicates high market share.

The company has also developed models that specify what information should be used to address a particular problem.



Source: TIBCO Spotfire (2013).

Source: Davenport (2013).

5. Conclusion

'Business as usual' is no longer possible for accountancy and finance professionals. The future depends on a new professional agenda.

For accountancy, as for most professions, technological change is a double-edged sword. It has the potential to replace or devalue traditional skills, but it also has the potential to help develop new ones. Big data will, over the next 5 to 10 years, create new opportunities for accountants and finance professionals to take a more strategic, more future-facing and more proactive role in organisations.

'I think that big data will provide a new lease of life for finance professionals. By embracing the concept of big data, by harnessing the benefits, I think finance professionals will sit at the strategy table rather than the finance table.'

(SUNDARA RAJ, CONSULTING LEADER, PWC MALAYSIA)

These opportunities offset the risk that the finance function will be downgraded as smart tools and technologies commoditise its skills. Making the most of them, however, will not be easy. The accountants and finance professionals who really differentiate themselves in the future will be those who use big data to:

- create insight – and further develop their core analytical skills
- identify innovation through new business models
- improve the quality of planning and forecasting, and
- contribute to business-critical decisions about strategy and investment.

Big data and its associated tools offer the possibility of reinvention, the chance to reposition accountants and finance professionals at the centre of organisations. If the finance function works more closely with other departments to unlock insights from data, its visibility in business will dramatically increase. It will come to be seen not as a service department but as a strategic partner that helps leaders make and validate their decisions. Furthermore, the potential of big data to demonstrate connections between non-financial data and financial value through integrated reporting means that the accountancy and finance functions could play a greater role in promoting integrated thinking across organisations.

Once organisations realise the connection between non-financial information and financial value, there is a greater likelihood that silos will begin to break down within the organisation as the finance team and others – such as human resources, operations, marketing and public relations – collaborate to ensure that those linkages create financial value.

It is important, however, to understand the realities of what big data means. Valuing and accounting for big data are likely to be among the biggest challenges over the next 10 years, requiring the development of new metrics and accounting standards. Extracting value from big data, meanwhile, will demand the development of new and different skills. Data science will need to be combined with data art to provide information and insights that organisations can easily access and use. The ability to help tell the 'story' of data – in, for example, visual form – will become almost as important as the ability to analyse and interrogate it.

Already, we are seeing the emergence of new technical skills sets. People trained in software tools such as XBRL (eXtensible Business Reporting Language) are becoming sought after by finance departments, pointing to a growing overlap between functions traditionally seen as distinct.

Accountants and finance professionals who integrate their core skills with new skills in big data and analytics will help organisations to:

- improve decision making
- manage risks
- identify and develop new markets
- improve operating efficiency
- increase margins.

The future of the accountancy profession lies at the intersection of finance, technology and information. The next 10 years could see the emergence of new professional hybrids in senior management or on boards: the CFTO and the CFIO (see Figure 5.1).

'Consider the birth of a new chief finance and technology officer (CFTO) or chief finance and information Officer (CFIO) position whereby the individual possesses a balance of financial and technology/information management skills to help the company manage its big data assets to [enhance] profitability and economic value.'

(BRAD MONTERIO, MANAGING DIRECTOR, COLCOMGROUP INC)

By crossing the discipline of finance with the disciplines of IT and information management, accountants and finance professionals will increase the net value they bring to the C-suite and the board.

'Any profession constantly has to evolve. Finance is no different ... There is no quick fix, no light-switch solution. This has to be a broad, continuous effort. This has to be a journey. We need to marry trends [in big data] to the curriculum of the profession, not only for the upcoming students but also for the existing members, too. If we don't, we won't be able to cope with what CEOs will need.'

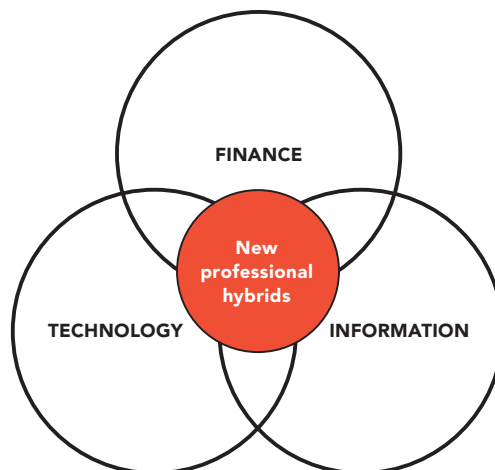
(ASHTON DALLSINGH FCCA, VICE PRESIDENT AND CFO, EMEA AND RUSSIA, CISCO)

'I really hope that the accountancy profession will not step away from working with information technology and business analytics functions because we really should be out there with them to bring value, and at the same time to bring stewardship.'

(NINA TAN CPA, ACCA, CFO, TRAX TECHNOLOGY SOLUTIONS PTE LTD)

Big data will be one of the transformational opportunities of the 21st century. Whether it transforms the finance and accountancy professions for better or for worse depends on how they choose to respond to the challenges it creates.

Figure 5.1: New accounting and finance professional hybrids



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Appendix: Contributors to this report



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Julia directs and oversees all areas of work relating to ACRA's regulation of the accountancy sector in Singapore. This includes the audit oversight of public accountants and public accounting entities as well as the oversight of financial reporting by companies.



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President, Association of International Accountants (Singapore) and president of School of Finance (Singapore) and executive director of Sovereign Richwell (Far East) Co Pte Ltd



Michael has also served as head of trade banking and vice president of Bankers Trust (NY) for Singapore, Malaysia and Indonesia, and as auditor and board director of United Nations Association of Singapore. He was given an award for his contribution to the UNAS Model United Nations Preparatory Conference.

GARY COKINS

Founder and CEO, Analytics-Based Performance Management LLC



Gary is the founder of Analytics-Based Performance Management LLC, an advisory firm. He began his career in industry with a Fortune 100 company in CFO and operations roles, followed by 15 years in consulting with Deloitte, KPMG, EDS, and SAS.



GLORIA TAN

Group financial controller and director, Asian Women's Welfare Association



Gloria oversees finance, including financial accounting, management and statutory reporting, treasury, budgeting and internal control review, and develops policy and procedures for better corporate governance control. Previously, Gloria held positions as an accountant, internal auditor and assistant manager of corporate services.



GARY BOOMER CPA

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Gary is recognised in the accounting profession as the leading authority on technology and firm management. For over a decade, he has been named by *Accounting Today* as one of the 100 most influential people in accounting. He is also a member of IPA's 10 most recommended consultants. He is currently a member of the AICPA Life Insurance/ Disability Committee and accounting advisory board at Kansas State University.



ASHTON DALLSINGH FCCA

Vice president and CFO, Europe, Middle East, Africa and Russia, Cisco



Ashton has over 20 years' leadership experience in diverse industries including public accounting, oil and gas, telecoms and IT with companies such as Ernst and Young, Conoco DuPont, Rogers Inc and Dell Inc, living and working in numerous cities including Toronto, Dublin, London and Beijing. Ashton believes that organisational capability is a key to organisational success and that finance leadership enables corporate transformation.



BRAD J. MONTERIO
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Brad advises companies on growing market share, opening new markets, developing new revenue streams, driving market adoption and sourcing strategic partners. Brad counsels clients in the financial services, financial technology, XBRL, ESG, integrated reporting, sustainability, CSR, accountancy and investment advisory sectors. He also co-authored 'Bringing Order to the Chaos: Integrating Sustainability Reporting Frameworks and Financial Reporting into One Report with XBRL' for Harvard Business School's first eBook, *The Landscape of Integrated Reporting*.



STEVE WILLIAMS
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Steve leads strategy and roadmap engagements for Fortune 500 and mid-market companies seeking to leverage business intelligence, performance management, big data and analytics to improve business performance. His experience leading 13 BI strategy engagements and judging TDWI Best Practices competitions for 14 years brings a multi-industry, multi-function perspective to the formulation of pragmatic BI strategies and practical roadmaps for improved business performance.



RICHARD SIDNEY
Manager, Deloitte



Richard specialises in performance-led finance transformations for organisations across the private sector, including large telecoms companies, global media corporations and complex consumer businesses. He has a wide knowledge of advanced analytics tools and methods, including big data, data mining and data warehousing, and has implemented a range of traditional planning and reporting tools.



**VIVEKANAND
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Director of research and
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Vivek has over 20 years of experience in research, teaching, consulting and practical application development to solve real-world business problems using advanced analytic techniques. He advises clients in their strategy for driving insights to business action, and specialises in architecting innovative solutions that mine insights even when the data is not well-behaved. Vivek's approach to business problems has led to him to advise a wide-range of clients, from banking and real estate to telecommunications and technology.



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Harvey is the research director for data and analytics at Deloitte, leading a small team of researchers and data scientists investigating big and open data. He also uses open-source technologies, such as R and Python, combined with open data to illuminate topical business issues. Besides helping UK clients to use open data, he supports overseas initiatives through Deloitte's international network of member firms. Author of numerous reports and articles on data analytics, Harvey is a regular commentator in the press and at conferences.



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Alex is senior strategist at Fabric, the WPP-backed data management platform for marketing used by over 140 brands in 25 markets. He is responsible for development of Fabric's core technology product, working with global marketing clients to help them set data strategy, unlock the value in their data, and act faster on creative opportunities. Alex has worked in strategy and consulting roles on three continents.

AMBER ARNHOLD CMA
Senior finance manager,
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Amber has held various financial roles, with domestic and international experience in audit, controllership and financial planning and analysis at Honeywell. Currently the senior finance manager for the aerospace business and general aviation aftermarket, she is responsible for partnering with business leaders in prioritising resource and investment opportunities optimising results for the business aviation market.



TONY LEVY
Business unit executive, IBM
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Tony is a business unit executive with IBM Software Group. He has a passion for helping clients drive business performance through the strategic application of business analytics software. He has over twenty years' experience with enterprise solutions within the Global 2000 in operations and finance.



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Eliot has worked in a variety of technology and services consulting and managerial roles across sectors that include finance and insurance, manufacturing, utilities, distribution, telecommunications, market research and defence. Eliot joined IBM in 2009 when IBM acquired SPSS, the predictive analytics company.



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Angie leads a large, diverse and multi-cultural team (including a captive shared services centre) of 200+ across 16 countries in Asia Pacific. She is a strategic business partner to the CEO/COO on financial advisory and M&A matters, especially business management in Asia Pacific. Angie has over 20 years' experience as the number one finance lead in Asia Pacific covering multiple industries.



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Bridging the gap between advanced data analytics and traditional reporting, Daniel has made a career out of applying technology and mathematics to make business faster and smarter. He works with clients such as the US Marine Corps, FEMA, Shell, and TransAmerica; his team develops predictive customer models to maximise advertising ROI and to deploy intelligent digital methods for rapid communication of results.



**RANDOLPH P. (RANDY)
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Randy has been a top rated speaker in the technology industry for over 30 years. He was inducted into the Accounting Hall of Fame in 2011 and was selected as a top 25 thought leader in accounting from 2011–13. His influence throughout the accounting industry is highlighted once again this year by being a recipient of the 2012 *Accounting Today* top 100 most influential people in accounting award for the ninth consecutive year.



JAKE BARTON ACA
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Jake oversees financial matters for several operating companies across Kantar. He will also take on responsibility for the SOX/corporate governance and procurement functions within the organisation. Jake leads implementation of best practice across the client base for contracts and commercial terms as well as ensuring an increased focus on client profitability.



AGATA WATERLOOS FCCA
CFO, Microsoft Slovakia



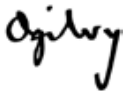
Agata's responsibilities cover development of the financial plans and financial strategy of the company, and finance management focused on business and financial controlling, reporting and business analysis. Before joining Microsoft, Agata managed finance at the Slovak subsidiary of Pernod Ricard. Agata began her professional career at PricewaterhouseCoopers, both in Slovakia and Czech Republic.



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Swee Wan leads Nexia TS's Forensic Technology Services. He has managed numerous forensic technology and IT advisory assignments in Singapore and the region. Swee Wan has trained regional law enforcement agencies in cybercrime investigations, testified in courts as expert witness on electronic evidence, spoken at international conferences and is quoted in various publications and the national press on forensic technology.



MATTHEW BAYFIELD
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After training as a psychologist Matthew was initially a lecturer in social research methodology at the University of Surrey. Through working with the not-for-profit sector, Matthew looked at the effects that data manipulation and analytics could have on charitable donations. In 2000, Matthew founded the insights consultancy, Tree, specialising in data, analytics and research, tree working for brands such as o2, Virgin, Sony, Rolls Royce, Hitachi, Singpost and VW. After selling Tree to Chime Communications PLC in 2011, Matthew moved to Ogilvy to head up the EAME group data practice for Ogilvy & Mather.



TOBY HATCH
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Toby has focused on research, writing, and speaking about EPM and BI topics for over 24 years. She is a founder of the Business Research and Analysis Group, has co-written a book on business scorecards, is a host for a podcast series called AppCasts, and is a regular blogger for Oracle. Previously, she supported and implemented scorecards and EPM solutions in companies worldwide.



JOHN O'ROURKE
Vice president of product
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With a background in accounting and finance, John has spent over 25 years in the software industry, and 16 years in product marketing at Hyperion Solutions and Oracle. He has worked on many financial reporting and planning initiatives and has spoken and written widely on enterprise performance management. John has also held positions in strategic marketing and product marketing at Dun & Bradstreet Software, and Kenan Systems.

PHILIPS

QUEK KENG SWAN
Financial controller Asia-Pacific, Philips Healthcare



Keng Swan is the regional financial controller for Philips Healthcare Spare Parts Supply Chain. Before joining Philips Healthcare, Keng Swan was previously employed at Lucent Technologies and Verizon Business, leading the regional Shared Services Centre for the latter.



SUNDARA RAJ
Consulting leader, PwC Malaysia



Raj leads PwC's consulting practice in Malaysia. He also sits on PwC Malaysia's executive board. Raj started his career with PwC Malaysia's corporate finance practice and was instrumental in establishing its consulting practice. Today, PwC Consulting provides industry-focused management, technology, and risk consulting services for leading companies locally and regionally. Raj specialises in strategy, transformation, and people and change.



IAN BETTS FCCA
Data manager upstream and projects and technology, Shell



Ian leads Shell's upstream data management drive with a team located across shared service centres in Chennai, Manila, Kuala Lumpur and Glasgow. Previously he supported the transformation of Shell's downstream business as finance manager and, before joining Shell in 2007, held multiple finance roles with Kraft Foods in Europe, Asia Pacific and North America.



THOMAS EGAN
Head, group accounting policy and advisory, Standard Chartered Bank



Thomas' responsibilities include thought leadership and optimisation of accounting outcomes; he serves on the ACCA Global Forum for Corporate Reporting. He is involved in XBRL, the digital format for reporting financial information, and serves on the IASB's XQRT committee. Previously, he headed the wholesale banking technical accounting function at Standard Chartered and was technical director at Deloitte in Singapore.

PETER TEMPERLEY ACA
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Peter is a business transformation consultant specialising in the insurance sector, being highly effective at working with both business and IT. Formerly responsible for delivering change in a number of different roles at Aon over a 12-year period, he most recently established and led a programme to develop and implement a new management information strategy and infrastructure in Aon UK.



KEVIN LONG FCA
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Kevin, who trained as an accountant with Ernst & Young, has a combination of business, financial and IT skills. He specialised as an information systems auditor, followed by financial and operational system integration projects. With over 15 years' consulting experience (Deloitte, HP and Teradata) Kevin has been involved in data projects for over 20 years, working on a wide range of analytical projects across diverse geographies and industries.



PRERIIT SOUDA

Analyst, marketing science (advanced analytics), TNS Global



Preriit consults internal clients on advanced analytical requirements for their projects and has been developing techniques for analysing new and advanced data visualisation methods. Previously, Preriit was research assistant to the chair of the marketing department at Southern Methodist University (US). He was ESOMAR young researcher of year (2011), named as one of the new faces of engineering 2012 (nominated by IEEE USA) and won best analytics paper award at the MRSI annual conference in New Delhi.



BOB BURGOYNE

Global head of marketing science, TNS



Bob leads TNS' global strategic appraisal of the challenge and opportunity presented to the research industry by big data – new data sources and associated analytical techniques and use-cases. Bob co-wrote a TNS 'point of view' piece on the topic and has spoken at various industry events. Bob works across TNS and other Kantar/WPP companies to test and refine new data methodologies and integration opportunities.



NINA TAN, CPA (ISCA), ACCA

CFO, Trax Technology Solutions Pte Ltd



Nina is an international delegate having spent 14 years abroad in UK and China. She has garnered more than 20 years' experience of multinational corporations, international listed companies, GLCs, audit firms and start-ups. Nina's expertise in global M&A ventures led to her own successful start-up specialty chemical company; consolidation between SingTel and ST Telemedia's trunk radio business and the merger of Sunpage/ST Mobile Data/ST Trunk Radio.



JAMES BOURKE CPA, CFF

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James is a partner, member of the board of directors and a member of the management committee at WithumSmith+Brown, Red Bank, New Jersey and is director of firm technology. He has authored many articles dealing with firm technology issues and was featured on the cover of past issues of *Accounting Technology Magazine* and *Practical Accountant Magazine*. Jim has also been named by *Accounting Today* as one of the top 100 most influential people in accounting for the last six years and has been named by the CPA technology adviser as a top thought leader in public accounting technology.



SANDRA B. RICHTERMEYER CMA, CPA

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Sandra has over 20 years' experience in enterprise systems implementation, corporate governance, managerial and non-profit accounting. She recently served as global chair of the IMA and is currently on the board of COSO. She has written many academic and practitioner publications and frequently speaks on financial leadership, governance, technology integration and performance measurement. Sandra has held many directorships and helps boards in a variety of organisations to improve governance and strategic oversight.

MAHESH KOTAI CA, FCCA

Auditor and risk control consultant



Mahesh has over 25 years of professional and hands-on experience, as risk controller, consultant and auditor, carrying out various operational risk control processes and audits for financial institutions and public accountants. Taking full responsibility for assigned projects, Mahesh works both independently and with teams to provide highly visible and successful operational efficiencies.

POL-AFA-BDPAP