Harnessing the Growth Potential of Big Data:

Why the CEO Must Take the Lead

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Preface

A sea-change is occurring in the way forward-thinking corporations are harnessing the potential of data.

The amount of information corporations have to handle is growing exponentially as new forms of data, such as video and social media, are added to existing corporate data. Now the opportunity has emerged to use that data to think creatively about improving operations and interactions with customers and suppliers as well as driving growth by creating new business and revenue streams.

This data is called Big Data.

While Big Data is the latest buzzword in an industry renowned for its hype, there is something behind all the excitement, and all the signals are that it has the potential to be a game-changing competitive weapon. The timing of this sea-change is good because organisations of all sizes in the UK today need to find new sources of growth.

For too long corporations have been unable to extract the fresh insights they need from their transactional data, never mind the increasing deluge of unstructured and externally sourced data. Today, finally, the technologies are commercially available to surmount these challenges.

But these technologies are useless without vision and leadership from the top. At the heart of this challenge lies a new approach to thinking about information and strategy.

So we've prepared this paper specifically for CEOs because we are convinced that the benefits of Big Data will not be realised unless the CEO takes charge of their organisation's information strategy.

There are lots of papers that describe the potential of Big Data. This paper shows you how to take the first steps.

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Overview

Digitisation is all around us. Just look at the impact that it has had on our daily lives over a few very short years. We now send emails rather than write letters. We talk to others on our mobile phones, often with video, rather than when shackled to a landline. We can stream a movie for immediate screening rather than renting a video. We book airline flights and hotels over the Internet rather than call our travel agent. We pay bills and transfer money without going into our bank. We buy groceries, books, music and other products online rather than visit a store. We pay for our TV licence, make our tax returns and tax our car, all without having to visit a government department or state agency. And social media is playing an increasingly important role in many aspects of our daily lives.

The relentless deployment of IT by organisations of all kinds is at the heart of this drive towards digitisation. With their IT strategies, executives actively seek to automate their operations and how they interact with customers and suppliers. Businesses have digitised their order processing, fulfilment processes and interaction with customers. Enterprise systems are implemented to tie an organisation – even a global one – together to create a single integrated entity. Workflows are automated, often allocating work to employees based on finely honed business rules. Supply chains are optimised using a variety of technologies that integrate all players in an ecosystem. Sensors located on everything from roads to jet engines are now measuring and communicating location, movement, vibration, temperature, humidity and even chemical changes in the air. Social media platforms and collaborative tools are tying people and organisations together while start-ups are providing enabling infrastructures facilitating connectivity and interactivity only dreamt of a decade ago.

The consequence of all of this is that more and more of our business and personal life is taking place in a virtual world; a world that is defined and shaped by bits and bytes. The result is an explosion of digital data that is growing exponentially. This data is not just structured transactional data but now includes unstructured data like intentions, thoughts and images. This expanding volume of data has been referred to as "big data." Yes, it is causing big problems for organisations and can overwhelm them; but it is also offering big opportunities. What is abundantly clear: data is becoming a new factor of production and of wealth creation.

Over the last 18 months, much has been written and spoken about the tremendous opportunities that big data provides. Yet, all these missives are silent on the how question. As a CEO, how can you ensure that your organisation is harnessing the potential of big data? What opportunities does it offer your business? And what should you, as CEO, be doing? This paper is written with you in mind to help you navigate the big data landscape and to position your organisation to capitalise on any opportunities.

Big Data, Big Opportunity

Let us be up front. Organisations have always struggled with their data, so any suggestion that getting to grips with data is somehow a new problem is completely misleading. It's just that the problem has gotten much bigger; perhaps this is why is it referred to as "big" data? But with this big problem comes potentially big opportunities.

Indeed, when computers were first introduced into organisations it was in an attempt to tame data. The paper-based organisation of yesteryear was inefficient, slow and prone to errors. New information technologies speeded up processes, increased accuracy, and facilitated data storage for easy recall. Initially, IT was deployed to remove the laboriousness of doing the weekly payroll and other mundane tasks. Soon IT was becoming a source

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of competitive differentiation as organisations sought to proactively harness IT in innovative ways. Over the years, however, one thing remained constant: IT was implemented to manage data generated inside the organisational boundary or data that resulted from business interactions.

Of course, outside the enterprise's boundary, other organisations (competitors, customers, suppliers, regulators, government, etc) were also deploying their own technology with a similar focus. It was only with the emergence of the Internet that a realistic capability to connect up the data silos of all these entities emerged. Today, the so called "Internet of things" is where everyday physical objects are connected together and seamlessly integrated into this information network. It is this interconnected network that is at the heart of the big data challenge.

The paradox of these technologies is that they were introduced to solve the data problem but have actually created an even bigger one! These very same computers that were supposed to manage data are now a cause of this massive data deluge.

When we are considering big data, it is useful to think about it along three dimensions: volume, variety and velocity.

- **Volume** refers to the fact that enterprises of all types are awash with ever-growing data of all types, easily amassing terabytes—even petabytes—of information. Trying to analyse data of this scale is a challenge in itself.
- **Velocity** is concerned with the time value of data; sometimes even ten seconds is too late. For time-sensitive processes such as catching fraud, this data must be used as it streams into your enterprise in order to maximise its value. A telecommunications organisation, for example, might analyse 50 million call detail records per day in real-time to predict customer churn faster. Or a credit card company might scrutinise five million trading events per day to identify potential fraud.
- **Variety** signifies that big data could be any type of data - structured and unstructured data such as text, sensor data, audio, video, click streams, log files and more. New insights can be found when analysing these data types, particularly when different data sets are combined.

Most of the big technology vendors are trying to muscle in on the big data game. Read their promotional material and you would be forgiven in thinking that it is a technology problem requiring a technology solution. Let us be clear. There is no solution to the big data challenge that can be purchased off-the-shelf. Technology can offer part of what may be required, by providing the tools that deliver the capability, but it is imperative that what technology will be deployed to do is clearly articulated.

As CEO you might be thinking that the challenge of big data is a problem for your chief information officer (CIO). But we would advise you to think again. The irony is that, although it stems from deploying IT, solving it really has little to do with technology. It is about information and how you and your organisation choose to use it. Many years ago Bill Gates, founder of technology powerhouse Microsoft, captured the challenge very eloquently: "The best way to put distance between you and the crowd, is to do an outstanding job with information. How you gather, manage, and use information will determine whether you win or lose."[1]

As CEO it is your responsibility to ensure that your organisation is harnessing the potential of big data and ultimately whether you win or lose in your market. While improved understanding of operations can lead to the identification of opportunities for efficiency gains, big data can also signal opportunities for growth.

Before we explore big data, we would like to point out that we are using the words data and information interchangeably in this article. While arguments for differences between each can be made, for the purposes of the messages that we want to leave you with, these are irrelevant.

The Duality of Big Data: Exploration and Exploitation

When pondering Big Data, we have found it useful distinguishing between exploration and exploitation. Actually, the concepts can be considered as two sides of the same coin, but more about that later.

Exploration is using data to better understand something; whether this is your customers, operation, supply network, or the marketplace. This data may be internally generated from operations or result from direct interactions with customers. Sometimes it may come from external sources, such as comments about your products or services posted on Facebook or tweets on Twitter. For an electricity provider, the challenge might be converting 200 million meter readings per annum to better understand power consumption in order to optimise the production of electricity. Insurance companies might use predictive modelling to estimate the likelihood that a claim is fraudulent based on common characteristics of past fraudulent claims. While the tech industry refers to this as "insight" or "business intelligence" it is essentially about discovering new knowledge.

Some of the ways that data is being explored include: modelling risk, conducting customer churn analysis, predicting customer preferences, targeting ads, and detecting threats and fraudulent activity. This often requires that datasets from diverse sources be combined and examined. For example, Her Majesty's Revenue and Customs (HMRC) is combining external data from credit and other institutions with its own internal data to identify potential under-declaration of tax liabilities.

The exploration of data is also revealing some unexpected results. Public health researchers, for example, have found a spike in Google search requests for terms like "flu symptoms" and "flu treatments" a few weeks before there is an increase in flu patients coming to hospital emergency rooms. Central banks are currently studying whether keyword searches, reported by Google as soon as the queries take place, can provide lead indicators of consumer demand before official statistics become available.[2]

Sometimes a company may be pro-active in gathering data. For example, many companies have implemented customer relationship management (CRM) technologies to glean information about customers (demographic details, choices and preferences) and information from customers (as a result of their interactions and exchanges). One of the things they then look to do is use this information to tailor offerings to customers based on anticipated needs that they glean from historical data. Amazon claims that 30% of its sales are generated as a result of its recommendation engine: "customers who bought this book also purchased...."

But exploration applications of big data are getting ever more sophisticated. Using video, some retailers are now building systems to better understand customer behaviour when they are in the store. In most cases, this video data is taken directly from a store's existing security camera system. That feed is analysed and correlated with sales data. Some retailers are also integrating with data from hardware such as radio-frequency identification (RFID) tags and motion sensors to track how often a brand of cereal is picked up or how many customers turn left when they enter a store. Using video, luxury retailer Montblanc generates maps showing which parts of the store are most-trafficked to help decide where to place in-store decorations, salespeople,

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HMRC: COMBINING EXTERNAL DATA WITH ITS OWN INTERNAL DATA

[1] Business at the Speed of Thought: Succeeding in the Digital Economy, Penguin Books Limited, 2000.
[2] See 'What is your central bank Googling', Bloomberg Businessweek, August 13-26, 2012, pp.13-14.

Many of the uses of big data actually rest on the interplay between exploration and exploitation.

and merchandise. Such analysis can often throw up insights that refute conventional wisdom. For example, many food manufacturers pay a premium for their products to be displayed at the end of an aisle. But what retailers are finding is that customers actually pay greater attention to products placed in the centre of an aisle.[3]

Exploitation is using data to take advantage of information asymmetries; it is about making the invisible visible. These asymmetries arise when one party to a transaction/interaction or potential transaction/interaction has more or better information than the other. By identifying these asymmetries an organisation can avail itself of opportunities, through the medium of technology, to change what the organisation does, providing a potential source of competitive differentiation. For example, manufacturers often hold stocks of raw materials to buffer against uncertainty in their supply chains – what is often referred to as "safety stock." This uncertainty is caused by having an incomplete picture of production processes, schedules and stock levels at suppliers. Making this information available to the manufacturer reduces uncertainties caused by these information asymmetries. Armed with this information, manufacturers no longer need to tie up working capital in raw material inventories and risk obsolesences and can execute a Just-In-Time (JIT) strategy. JIT is essentially about replacing inventory with information.

It was information asymmetries that saw many utilities and retailers enter the financial services marketplace in the 1990s. They argued that they had more information about the customers of the banks than banks had about their own customers. And while it might be argued that this was a case of unrelated diversification (i.e. moving into another industry), if one defines an industry by the amount of information incumbents have of customers, then a different conclusion can be reached. It is these same asymmetries, for example, that see shoppers using their mobile phones to scan bar codes to find out if there is a better deal elsewhere.

As we have suggested, many of the uses of big data actually rest on the interplay between exploration and exploitation. Thus, by generating new insights from exploring data, an organisation may choose to then exploit any information asymmetries that may be revealed. It is these information asymmetries that are enabling technology companies Google and Microsoft to make moves into the healthcare market: Google Health and Microsoft HealthVault both allow customers to track their health and record their treatments.

Generic strategies for Big Data

When we survey what organisations are actually doing with big data, we can identify five generic strategies. These strategies provide pointers as to how to you might begin to think about harnessing the potential of big data for your organisation.

Do what we always do, but better

This generic strategy is about the organisation improving how it does things. Using data generated as part of its operations, an organisation seeks to generate insights that enable it to identify areas of its operations where there are inefficiencies that could be improved. For example, where are the bottlenecks in the fulfillment process? Are there any particular factors that indicate when a customer is considering moving to a competitor? Can it predict a customer propensity to purchase a particular product?

Retail right now is up against it because e-tailing has made owning a bricks and mortar store risky. Dynamic pricing and in-store experience are two ways bricks and mortar outlets can attack. Tesco uses its loyalty card, Clubcard, to

[3] For more on this application, see 'Big brother has arrived at a store near you', Bloomberg Businessweek, December 19-25, 2011, pp. 41-42.

track which stores customers visit, what they buy, and how they pay. This has enabled the retailer to adjust merchandise for local tastes and to customise offerings at individual levels across a variety of store formats. Sainsbury's is using big data to help it set prices – nearly in real time – and shift inventory by giving loyal shoppers customised coupons. Retailers, including Amazon, are now practising dynamic pricing, changing the price of products from toilet paper to bicycles on an hour-by-hour, and sometimes minute-by-minute, basis. One goal is to maintain the lowest price—even if only by a penny—so that their products will show up at the top of the search results by shoppers doing price comparisons. Shipping companies, like UPS and Fedex, mine data on truck delivery times and traffic patterns to fine-tune routing.

Over the last decade, doing what it has always done better has propelled Las Vegas Casino Harrah's (now known as Caesars Entertainment Corp) from an also-ran to become the biggest and most successful gaming group in the world. With over 40 million members, its loyalty programme 'Total Rewards' is the largest database of customers in the industry. Today, the Total Rewards programme remains the linchpin of the company's success. The first loyalty programme in the industry to be applied across every casino in a company, it allowed for a more accurate analysis of betting patterns and a more equitable distribution of "comps" or free rooms, meals, show tickets, etc. In the past, such perks tended to go to the flashiest high rollers and the persistent comp-seekers, not necessarily those contributing the most to Harrah's bottom line. There is also a similar program for Harrah's staff, who are given points, based on customer satisfaction surveys, that can be redeemed through a website for products. Even Harrah's C-suite executives have their compensation pegged to customer service scores.

To analyse the customer data it collects, Harrah's spends about $100 million a year on information technology, compiling customer preferences and probabilities. One startling conclusion from its analysis of this data is that the company makes more money from elderly slot machine players than any other demographic in the casino – even the high-rolling millionaires casinos traditionally spent fortunes luring and flying in by private jet.[4]

Another example is Ford, and how it is using data it collects from cars to redesign future models. Ford is now looking at how it can use data collected from technologies embedded in cars to make better decisions, from marketing campaigns to vehicle safety features. Police departments are using computerised mapping and analysis of variables like historical arrest patterns, paydays, sporting events, rainfall and holidays to try to predict crime "hot spots" and deploy officers there in advance.

Do something different by harnessing existing or new data

This generic strategy sees an organisation using data to shape a new business model. The core of this business model is the value proposition to customers. This new value proposition is generally achieved by informating an existing product or service; that is, adding value through information.

Consider MAN Trucks, a company that has manufactured and sold trucks and can trace its heritage back over 250 years. With a declining market share, the company sought to improve this position. An analysis of the total cost of ownership revealed that, over a three year period, the actual cost of the truck only accounted for 10% of the total outlay an operator could expect to pay. The biggest cost was fuel and their calculations revealed that 10% savings on fuel could double the bottom line. The company adopted a strategy to tackle inefficiencies in driving, which are the main contributors to fuel consumption. The company designed a value proposition for customers around increased utilisation, fuel efficiency and greater up-time. It sees the cab as a "digital transport unit" providing data on how well it is being driven.

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HARRAH'S: FROM ALSO-RAN TO THE BIGGEST GAMING GROUP IN THE WORLD

[4] For more on Harrah's, see 'How to survive in Vegas', Bloomberg Businessweek, August, 2010.

With the latest generation of smartphone incorporating Near Field Communications (NFC), the phone has the potential to become a credit card

The analysis of the data they collect reveals how the truck could become more efficient. The success of this strategy has seen the company evolve its proposition so it provides a fleet management service to operators - its "trucknology" service. CEO Des Evans notes that, even as a manufacturer, "it is no longer enough just to make something."[5]

On the services side, the Co-operative Insurance group recently launched an auto insurance product targeted at the stereotypical "boy racer," the 17 to 25 year old male driver. On every statistic, this category comes out on top: in the UK only one in eight driving licence holders is aged 25 or under, yet one in three drivers who die is under 25. An 18 year old driver is more than three times as likely to be involved in a crash as a 48 year old; one in five new drivers has a crash within 6 months of passing their test.

Like all insurance companies they have always known that, within this demographic of their customer base, there are some very responsible and good drivers. The problem is that they haven't been able to identify them. Today, they can now collect data on driver performance direct from the car, analysing data on cornering, speed, acceleration, braking and the times of day that it is being driven. Every 90 days they review driver performance and adjust premiums accordingly. The insured person also has their own personal portal to see how well they are driving with lots of advice on how to improve; the incentive being that any improvement in driving will see their premiums reduced. As might be expected, the proposition is very attractive to parents who typically buy insurance for their children in this age bracket. This data can now be used to better identify high risk drivers.

Do something new

This generic strategy involves the creation of an entirely new business. This might be an established organisation harnessing data creatively or a completely new startup business with no legacy.

An example of an organisation harnessing data creatively is telecommunications provider O2. The company has recently launched O2 Money, moving it into a market normally held by retail banks and credit card companies. O2 Money is like a prepay Visa card that a customer just tops up and uses wherever they see the Visa sign. People can use it online, in shops, restaurants, and even withdraw money from a cash machine. O2, like other telcos, has a billing relationship with customers and it is looking to capitalise on this. Money is nothing more than information, and with more transactions taking place in a virtual world, this is an obvious move for the telco. Already Wal-Mart and Starbucks have announced plans to make it easier for customers to pay using smartphones. With the latest generation of smartphone incorporating Near Field Communications (NFC), the phone has the potential to become a credit card and this is likely to have a disruptive effect on the banking, and credit card and payments industry. Far fetched? A decade ago, who would have considered Apple to be the number one retailer of music?

O2 MONEY: A PREPAY VISA CARD

Big data is also seeing the emergence of data aggregators. Climate Corporation is a start-up that is bringing data analytics to rural America and helping farmers reap more consistent profits from their fields. Historically, farmers have relied on crop insurance sold by the federal government. The programme is rife with all the red tape bureaucracies are famous for. Farmers must plant their fields on a schedule determined by the government and consent to inspections. To estimate crop value, they have to record and turn over years' worth of data about yields. When disaster hits, claims take months to process, and the payout often only covers costs, not lost profits.

This start-up has harnessed decades' worth of data from the National Weather Service and other sources to come up with a picture of rainfall, temperature, and soil conditions in farmland across America. The data sets are fine-tuned enough that Climate Corp. knows how the average weather at one spot differs from another three miles down the road. It uses this information, along with historic crop yields, to predict how next year's haul is going to look. The company has a bunch of

[5] Presentation at Cranfield University, 22nd February, 2012.

data scientists going over 30 years of daily weather data. For each location, they have simulated the weather for the next 730 days, 10,000 times. The data lets the company customise insurance prices according to each farm's risk factors and offer protection that supplements the federal offering, covering weather events including excessive rain and heat.[6]

Co-create value with customers

Rather than deciding internally what a customer wants, some companies are co-creating this value with them. Online company Threadless is a great example of a company where its customers do the market research, design the t-shirts and decide which t-shirts should be manufactured and sold.

While "closed" innovation approaches are internally focused and limited by the resources available within the firm, more recent "open" innovation seeks to identify, access, assimilate, and leverage the abundant knowledge and resources that exist beyond the boundaries of the firm in order to co-create value with external innovators. Open innovation models enabled by collaborative social technologies have greatly facilitated cooperation between organisations and current and prospective customers in relation to innovation. This has resulted in vibrant online user innovation communities such as Dell's Ideastorm, My Starbucks idea, IBM's Innovation Jam and food company Danone's community for its Activia brand. These initiatives are distributing problem solving to an unknown group in an open call for ideas and solutions.

A number of organisations have also begun running ideas contests, offering significant prizes for those judged to be the best. BMW recently ran an Urban Mobility Services Idea Contest, encouraging the generation of ideas that could be applicable for its business in the distant future. In contrast, Volkswagen's App My Ride's contest centred on two separate yet interconnected activities: idea generation and App (application) development. Participants were invited to submit ideas to the community idea 'pool', where ideas were subsequently discussed and elaborated upon by other developers in the community. This sharing dynamic emerged as a core value within the community and involved not just the sharing of feedback but also the sharing of detailed technical knowledge and ideas for further development.

This generic strategy sometimes sees an organisation "open up" its data, making it freely available for others to use. This practice is been driven by the public sector with "Open Data" initiatives, where data is providing a platform for innovation. In the UK, for example, Ordnance Survey makes mapping data openly available for anyone who wants to use it. This includes data on post code locations, gazetteer of road names, and the National Public Transport Access Nodes dataset which defines unique identifiers for bus stops and stations.

The Department of Transport in South Australia, like many government departments the world over, has been operating under tight budget constraints. The CIO was keen to launch an app for mobile phones enabling public transport customers to look-up timetables and check the status of trains and buses but he didn't have either the budget or in-house skills. He decided to make the relevant data available in an open data initiative, inviting third party developers to build applications utilising this data. These software houses generate revenue by selling the app on the iTunes store while citizens get a service providing public transport information that will be of value to them.

Monetise data

We have always known that information has a value, although it is difficult to place an exact value on it. Indeed, even though we might consider information as an asset, it does not appear on the balance sheet of a company. Organisations generate vast amounts of data as a byproduct of their operations. Often referred to as 'exhaust data', few organisations have ever considered harnessing this kind of data, but those that do can create additional revenue streams.

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BMW: URBAN MOBILITY SERVICES IDEA CONTEST.

[6] For more information see 'Algorithms on the Prairie', Bloomberg Businessweek, March 26-April1, 2012, pp. 37-39.

Research and our experience strongly indicate that harnessing big data requires vision and drive from the very top. In short, the CEO sets the tone.

Consider a mobile telecommunications company. To provide connectivity and coverage it has a cellular network; it also has demographic information about its customers for billing purposes. Thus, via its networking technology, it knows the location of each customer's mobile phone. Some telcos, including O2, are now combining these capabilities to offer a service to shopping malls and retail stores enabling them to track shoppers, providing a service that is similar to that which enables e-tailers to track customers when they visit their website. Integrating location data with customer data it can provide stores with demographic information about store visitors and how long they spend in the store. They can also provide information about where customers go after they leave. Moreover, whether they use their phone when in the store, perhaps to check a price at a competing store, can also be determined. This is all valuable information, which telcos recognise they need to handle responsibly to protect the privacy of their customer's personal data.

Getting started

A challenge for all organisations today is to immerse themselves in the wealth of structured, unstructured and real-time data generated from operational processes as well as that emanating from outside the organisational boundary, from customers, competitors, suppliers, business partners and other ecosystem players, and finding ways to capitalise on this data. This is not an IT issue – although there may be technical matters to address – but an issue for all executives. In particular, it is a challenge that CEOs must personally embrace as there can be strategic implications. Even if implications relate to operational matters, it is crucial that leadership is provided by the CEO and senior management team. Research and our experience strongly indicate that harnessing big data requires vision and drive from the very top. In short, the CEO sets the tone. This is particularly so where the widespread use of data for decision-making and knowledge discovery is both novel and perhaps even counter-cultural. Indeed, harnessing data may also require the complete overhaul of the organisation to create structures and processes that can respond to any insight gleaned in a short timeframe, potentially even in real-time.

Before embarking on a big data journey, we suggest pondering the following questions.

1. **Who is responsible for exploring and exploiting data/information in your organisation?**
2. **Do you know what customers are saying about your company and its products and services?**
3. **Is there information that could inform the design of the next generation of products and services that your organisation currently doesn't have?**
4. **Does your organisation have an information strategy?**
5. **To what extent is decision making in your organisation data driven? Would more data driven decisions lead to better decisions?**

Your responses to these questions should either give you a comfortable feeling or cause you to step back and wonder whether you are missing out on opportunities. Just in case you are still not convinced as to the central role of information for your business, the information highlighted on the facing page should dispel any reservations that you might have.

UPS & FEDEX: MINE DATA ON TRUCK DELIVERY TIMES AND TRAFFIC PATTERNS.

Information defines much of your business.

- Information represents a large percentage of the cost structure of any organisation. Attacking this cost is one of the main reason organisations invest in IT. For example, a significant component of the cost of the provision of healthcare in developed countries is the cost of capturing, storing, and processing information.
- Information is the glue which holds your organisation together. We have all heard of being a "joined-up company" – this is what we mean by this. For ease of management, to develop careers and build up centres of excellence, organisations will have some sort of division of labour, with people with different skills and competencies deploying their expertise in particular areas of the business. Achieving coordination and integration can only be facilitated by improving information flows between people, functions, departments and divisions.
- Information defines the structure of your industry. Information shapes the nature of coordination between all players in an ecosystem: customers, suppliers, regulators, etc. Identifying asymmetries in information provides opportunities to reduce coordination costs. It is this reduction in coordination costs that sees organisations make greater use of "the market" and outsource activities and processes rather than do it themselves "in-house." By making information visible, it may be possible to redefine the structure of an industry.
- Relationships between customers/suppliers are based on proprietary information. It is information that they have about their customers and that their customers have about the company and its products. With social media today, companies are seeking to reach out to customers and make it easier for them to connect ad interact and engage.
- Brands are nothing but information. Whether this is real or imaginary, intellectual or emotional, information shapes what we know and how we think about products and services. It must be proactively used!

This analysis draws on P. Evans and T. Wurster, Blown to Bits: How the New Economics of Information Transforms Strategy, Harvard Business School Press, Boston, 1999.

As we have demonstrated above, there are two ways to leverage big data. The first is through its exploration in order to improve the understanding of customers, operations, supply chains, etc. This is about the discovery of new knowledge and is often referred to as generating "insight." Data, whether generated internally or sourced externally, is explored to reveal this insight which may ultimately lead to some action being taken. This often demands creative thinking; for example, consider the central banker who first raised the possibility of investigating how Google searches might potentially predict the health of an economy far more accurately than traditional economic forecasting. While using this data for such a purpose may not be current practice or indeed obvious, there may also be other cause-effect relationships that can be explored. Of course, we do acknowledge that it is possible to correlate almost any two data sets to find relationships in a large data warehouse, so caution is urged if spurious correlations are to be avoided. This just highlights that the exploration of data cannot be abdicated and must embrace relevant knowledge and experience from within the firm in this process.

The second way of leveraging big data is by exploiting opportunities due to asymmetries in information flows. The making of "invisible" information "visible" to employees, customers or business partners can lead to the creation of new value propositions or possibly opportunities to monetise this data. For example, informating a product, such as what MAN Trucks have done with their "digital cab" and making driver performance data visible, enabled the firm to create a new value proposition for customers.

This is not an IT issue – although there may be technical matters to address – but an issue for all executives.

TESCO: USING CLUBCARD TO TRACK CUSTOMER VISITS AND BUYING

Companies expect to invest both time and resources in product and service innovation. We advocate a similar stance for identifying opportunities to do with data.

Identifying big data opportunities is ultimately about being innovative and requires creative and entrepreneurial thinking. However, there is no systematic approach that can be followed that will automatically lead to a great idea. As an innovation process, it is about being creative, curious and open minded. It is a voyage of discovery and needs to be managed and resourced as such. It also requires proactive management.

Companies expect to invest both time and resources in product and service innovation. We advocate a similar stance for identifying opportunities to do with data. As a starting point, we would suggest establishing a "data lab." It is not necessary for this lab to start out as a separate organisational unit, although it eventually may become one. Rather, it can begin as a project bringing together a cross-functional team of open minded people to explore data. Creating an initiative that fosters collaboration is most likely to result in new ideas coming to light.

One thing that we would advise against is treating any initiative to address big data as an IT issue. Most IT professionals, having engineering, computer science, and math backgrounds, are strong process thinkers and very logical in their analysis. This is how computers work, and consequently they tend to focus less on the "I" and more on the "T" in IT. If your job is to build IT systems and these systems are for logical purposes, such as processing financial trades or customer purchases at a store check-out, these are ideal skills to have. If, however, the task is to support the discovery of knowledge these skills can become a hindrance.

You may wish to consider availing of the services of a data scientist to work in the lab. Such an individual represents an evolution from the business or data analyst role. They typically have strong business acumen, coupled with the ability to communicate findings to both business and IT leaders in a way that can influence how the organisation approaches a business challenge. Good data scientists will not just seek to address business problems, they will pick the right problems that have the most value to the organisation. Often described as "part analyst, part artist," they are inquisitive, exploring, asking questions, doing "what if" analysis, and questioning existing assumptions and processes.

Our experience and research suggests some guidelines for the operations of a data lab:

Break down siloed mentalities. Many companies have amassed mountains of data that often lurk in departmental "silos," such as R&D, engineering, manufacturing, or service operations—impeding timely exploitation. Information hoarding within business units also can be a problem: many financial institutions, for example, suffer from their own failure to share data among diverse lines of business, such as retail banking, insurance, wealth management, and lending. Often, this prevents these companies from forming a coherent view of individual customers or understanding links across financial markets.

Ask second-order questions. Instead of setting out to create a system that can help the sales staff easily find out "what stock should we place on shelves today," an initiative might begin with the question, "is there a better way of deciding on stock replenishment?" By posing these second-order questions, you are immediately assuming that the way decision makers currently operate could be improved.

Probe for what information you have and do not have. Avoid being bound by the data and systems that are available and accessible. They are limited by today's view of what information is relevant and usable.

MONTBLANC: GENERATE MAPS SHOWING MOST TRAFFICKED AREAS TO SITE IN-STORE DEMONSTRATIONS

Lab members should have the freedom to be imaginative in seeking opportunities to harness data. We have observed that creativity and an organisation's willingness to try new ways to solve old problems are often missing from big data projects. The lack of creativity is often driven by a myopic view of data and its value to the business. This can be a function of data silos that are highly complex to integrate, but more often, it stems from the reluctance to search for new solutions.

Identify exhaust data and consider how it might be exploited. Data is generated as a by-product of operational, customer and supplier processes; do you know what this data is? For example, insurance companies deploy claims solutions to help them manage their claims management process. In additional to the information about the claim and the business rules that automate the process and drive the workflow, information about claimants behaviours, payouts associated with particular types of claims, etc may also be automatically generated but as a by-product to the real purpose of the claim system. Similarly, data from security cameras, used to guard against pilfering, can also be used to track shoppers as they make their way through the store and can be of use to merchandisers.

Strive to show relationships between cause and effect. Seek to draw attention to issues of concern and show how factors, particularly those within the organisation's control, can result in particular outcomes. It is important to move beyond symptoms, addressing questions like: What's the problem? Why did it happen? What will be done? From the data, determine the actions or events that seem to produce certain responses.

Be ready to reframe the why, what and how of your accepted approaches to business. What do we want to do differently? The team should drive for outside-in, not inside-out thinking.

Be willing to expose your assumptions, biases, blind spots to new and different insights. Use experimentation to test the limits of what you know and don't know.

Identify the "appropriate" analytical techniques and tools to enable new ideas and counter-intuitive insights. Have a healthy scepticism for analytical tools and techniques whose results are "too good to be true."

Big data and controlled experiments are tools for thinking, not substitutes. Remember, it is people who generate understanding and knowledge not technology so be prepared to get your hands dirty!

As a starting point, we suggest the lab explores how information impacts your strategy and how it might sustain a particular strategic trajectory. It has been suggested that there are 'three paths to market leadership', each of which require different sets of competencies and information has a critical role to play. That is not to say that there are only three routes, although the three—'Operational (or Process) Excellence', 'Customer Intimacy' and 'Product Leadership'—probably cover a significant range of the possibilities. They are simple yet useful concepts in enabling executives to define medium-term business strategy and establish an appropriate role for leveraging information. Some probing questions are presented in Figure 1.

We have observed that creativity and an organisation's willingness to try new ways to solve old problems are often missing from big data projects.

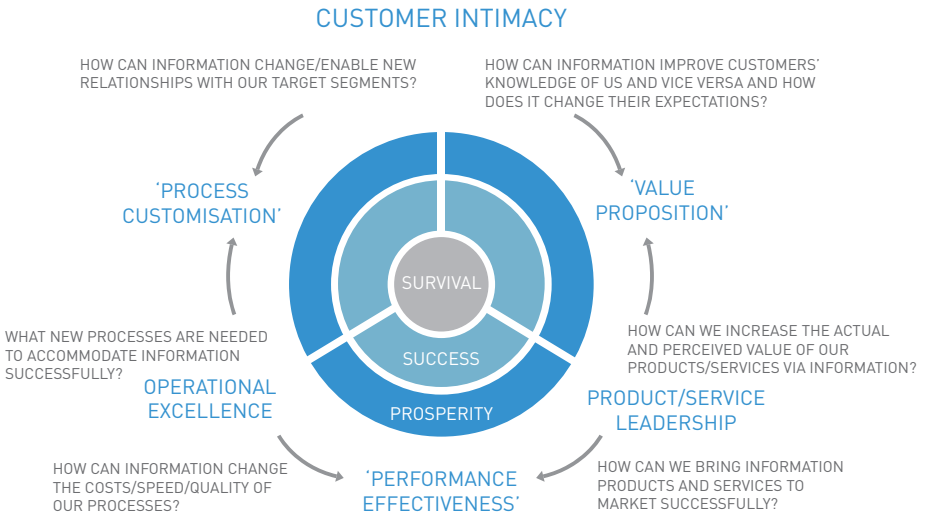
The purpose here is not just to 'satisfy' but to 'exceed' customer expectations

1. **Operational Excellence –** enabling products and services to be obtained reliably, easily and cost-effectively by customers. This implies a focus on business processes to outperform others and can deliver both low costs and consistent quality of customer satisfaction. In all cases, the companies' information systems investments are a critical component enabling business simplification and efficient processes that are highly integrated throughout the core activities of the business. Analysing data generated as a by-product of operations can identify bottlenecks and opportunities for improvement. Data collected from customer interactions can also point towards inefficiencies, particularly in fulfilment processes and high touch customer processes.

2. **Customer Intimacy –** targeting markets very precisely and tailoring products and services to the needs of particular customer groups. The purpose here is not just to 'satisfy' but to 'exceed' customer expectations by understanding their needs and meeting them on every occasion. Sometimes, it can involve personalising not only any communications but also value propositions. This can obviously be expensive but can build long-term customer loyalty. For example, can data be used to enable a retail outlet to tailor the 'product offer' to the locality through 'micro-merchandising' programmes affecting product range, promotion, pricing and store layout? Within such a strategy, information systems will focus on collecting and analysing customer information, covering not merely purchases but also other relevant attributes and feedback on products and services. This enables careful segmentation of the marketplace and targeting of the desired segments. Deciding who not to sell to, especially those who buy merely on price, is as important as targeting desired customers.

3. **Product/Service Leadership –** continuing product innovation meeting customers' needs. This implies not only creativity in developing new products and enhancing existing ones, but also astute market knowledge to ensure that they sell. The strategy involves delivering a continuous stream of new products and/or services, where what is new is valued by the customers. Gathering feedback direct from customer and indirect feedback from blogs, wikis and other social media interactions can provide data on products in use. Crowdsourcing ideas to enhance existing products or to find new ideas can help maintain a product/service leadership position. Innovation competitions can also generate valuable ideas.

FIGURE 1. Identifying opportunities to leverage information to support strategy execution.



FORD: USING DATA COLLECTED FROM IN-CAR TECHNOLOGY TO MAKE BETTER DECISIONS

The five generic big data strategies presented in the previous section can also be used to trigger some potential ideas where big data might impact your business. Here are some questions to get you started:

Do what we always do, but better	Are there areas of our business where there is a data deficit? What data do we not have, but if we did we could improve our performance?
Do something different by harnessing existing or new data	Could we redefine our value proposition to customers by harnessing existing or new data? Is there an opportunity to informate our existing products or services?
Do something new	Do we have data that will enable us to create an entirely new business?
Co-create value with customers	Can customers become part of our operational processes? Can we reach out to customers in a way that gives them a voice?
Monetise data	Are there opportunities for use to create a new business by leveraging data already generated as a byproduct of operations or that could be generated?

Additional considerations

The innovation process and the search for ideas to harness big data should not be constrained by potential challenges. They can only serve to limit the sphere of search. Indeed, any constraint may possibly have an innovative solution or workaround.

One of the challenges that all organisations face with big data is safeguarding the privacy of any personal, customer or patient data. This is clearly an issue, but one that can be addressed. It is important to be aware of legal restrictions, particularly in relation to any personal data that might be collected.

Invariably there will be problems with legacy investments in IT that can impact the harnessing of data. For example, pulling data from different areas of the business together can be a challenge, as it may be stored in different definitions and formats. It may also be of varying quality. These are all issues that can all be addressed, although we wouldn't like to trivialise them.

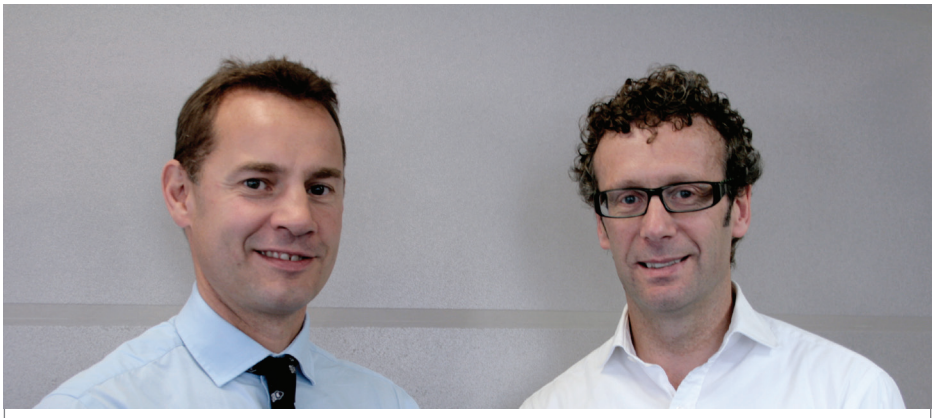
Conclusion

Data is often seen as "the new oil." But this ignores the fact that whereas there is value in having oil, there is no value in just having data. It must be exploited or explored. We have presented five generic strategies capturing how organisations are currently harnessing big data.

As CEO it is your responsibility to ensure that your organisation is harnessing the potential of big data and, ultimately, whether you win or lose in your market. While improved understanding of operations can lead to the identification of opportunities for efficiency gains, big data can also signal opportunities for growth. We strongly recommend establishing a data lab to proactively seek out opportunities highlighted from data and have suggested a number of guidelines that can provide direction in identifying opportunities.

One of the challenges that all organisations face with big data is safeguarding the privacy of any personal, customer or patient data.

About the authors



James Petter (left) is vice president and country manager for EMC in the UK and Ireland, and is responsible for the company's overall management, business strategy and revenue generation in the region.

James joined EMC in 2004 and has held various management positions within the business – including, most recently, a highly-successful two-year spell as Vice President of Global Accounts, EMEA, where he oversaw annual revenues of more than $1 billion. James' passion at EMC is having conversations with customers that drive a transformation agenda; challenging traditional assumptions around the way businesses are operated and in the way in which information is managed and used to drive growth.

Prior to EMC, James held several senior sales roles within Cisco Systems, Telstra and Coca Cola. Before this he spent seven years in the British Army (Royal Green Jackets), where he completed Officer Training at the Royal Military Academy, Sandhurst. James holds a BSc from the University of Surrey and a Postgraduate Diploma in Management Studies from Bristol University.

Joe Peppard holds the Chair in Information Systems at Cranfield School of Management where he is also Director of the Cranfield IT Leadership Programme. Additionally, he is an Adjunct Professor at the University of South Australia. Previously, he has held academic appointments at Loughborough University (United Kingdom), Trinity College, Dublin (Ireland), Groningen University (the Netherlands), Politecnico di Milano (Italy), and University of Sydney (Australia). In 2011 he was Dean's Distinguished Scholar at the University of Southern Queensland (Australia).

The focus of Professor Peppard's research and teaching is in the area of information, information systems and technology. Through his research he seeks to challenge dominant orthodoxies as he believes that these are contributing significantly to the problems that organisations have in leveraging information technologies, both operationally and strategically, and ultimately in optimising the value delivered to the business. His research has published widely in academic and general business and management journals and regularly presents his work at international conferences. In 2009 The Operational Research Society awarded him the prestigious Stafford Beer Medal for his research and he received the Best Paper Award at this year's American Marketing Association's International Service Research Conference.

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