

BIG DATA RECRUITMENT:

HOW AGENCIES SHOULD EMBRACE
DATA TO IMPROVE SERVICE
AND GAIN COMPETITIVE
ADVANTAGE



An etz Technologies eBook

Table of Contents

INTRODUCTION	1
1. BIG DATA. BIG PICTURE.	2
1.1 The Role of Technology	3
1.2 So What Is Big Data?.	4
1.3 Why Big Data? And Why Now?	6
2. BIG DATA IN ACTION	8
2.1 The Logistics Company	9
2.2 The Tractor Company.	9
2.3 The Digital Retailer	9
2.4 The Scientists	10
2.5 The Advertising Company	10
2.6 The One That Went Wrong	10
3. APPLYING BIG DATA TO RECRUITMENT	11
3.1 Seven Ways Recruitment Agencies Should Use Data	12
4. DEPLOYING BIG DATA	15
4.1 Calculating Return on Investment (ROI)	16
4.2 Who is Your Chief Digital Officer?	16
4.3 Privacy, Compliance and Moral Dilemmas	17
5. THE BIG DATA RECRUITMENT CHECKLIST.	19
CONCLUSION	22
Appendix I: Glossary of terms	23
Appendix II: Introducing etzInsights.	24
Appendix III: Sources	25

INTRODUCTION

Let's start with a question. Which Internet browser do you use? Perhaps you are using one right now to read this. Or perhaps you used one in order to download the eBook before reading it remotely. As a PC user do you stick with Microsoft Internet Explorer? As a Mac user is it Apple's Safari all the way? Perhaps you haven't given it a second thought. Or maybe the first thing you do when you get a new computer is to throw out the default option and download Google Chrome or Mozilla Firefox instead.

Think carefully before answering because your response may say something profound about you.

Bernard Marr is a Big Data consultant and author of *Big Data: Using Smart Big Data Analytics and Metrics to Make Better Decisions and Improve Performance* [1]. Asked by a client to help identify self-driven recruits – the initiative takers – Marr looked at a range of datasets that might help. He alighted at the choice of browser candidates had used to complete the job application. With a little more analysis he concluded that, indeed, this was a strong predictor of the right stuff – someone unwilling to settle for the status quo, someone with the confidence to go his or her own way.

This, in case you hadn't guessed, is Big Data in action, an example of measuring and analysing large amounts of information from a variety of sources – often at speed – and drawing actionable conclusions from what it shows. For the proponents of Big Data, this story exemplifies one of its real strengths – discovery. Opponents hint at hype, suggesting that at best, Big Data is little more than business intelligence redux.

In the course of this eBook, we will explain how Big Data works and examine the potential benefits for those of you in the recruitment industry. We'll share examples of good practice, case studies from your industry and from elsewhere. We'll discuss the practicalities – from identifying the skills needed to discussing privacy and compliance – and conclude with a detailed checklist for those embarking on a Big Data, or a smaller data analytics, project.

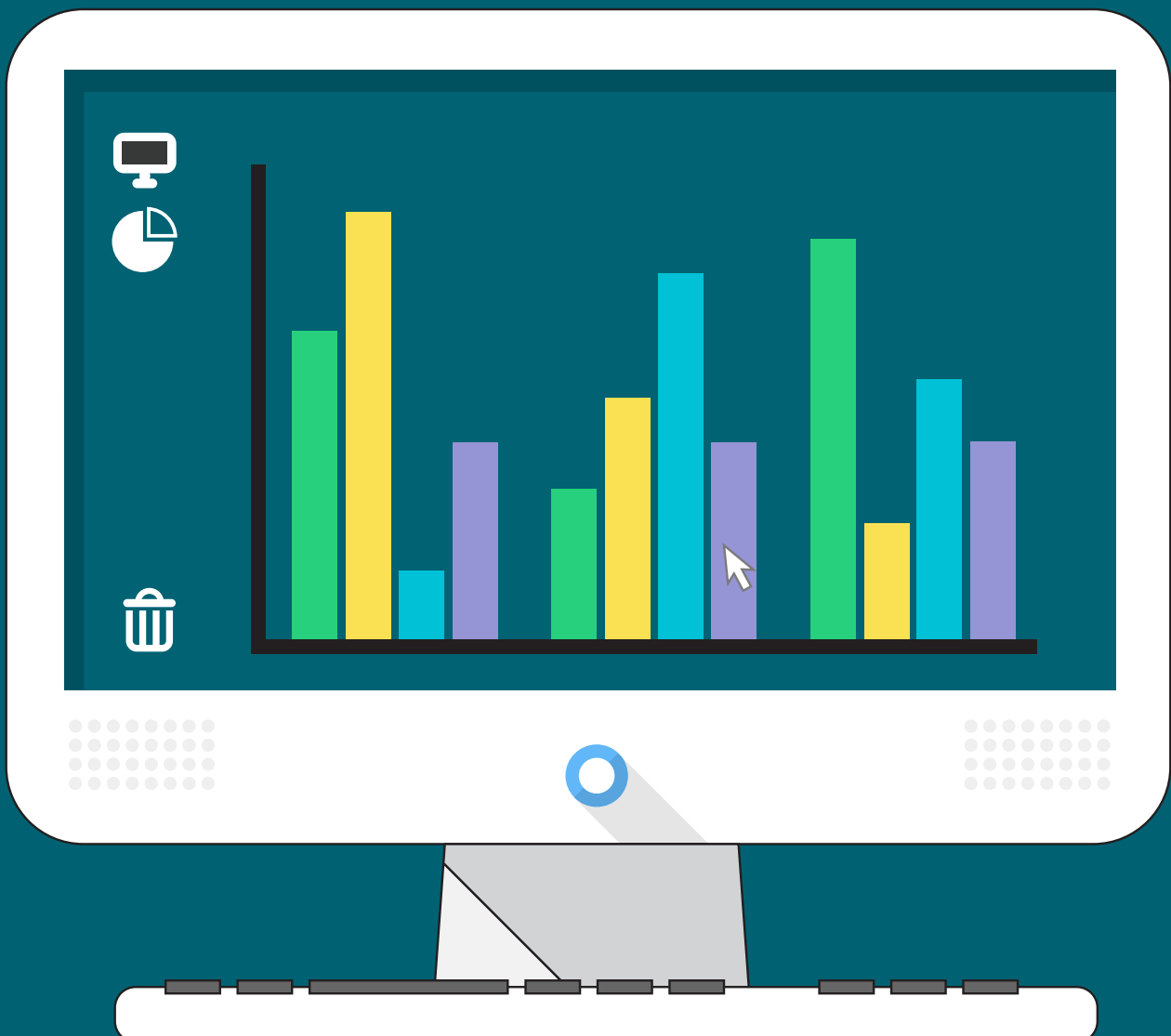
So why Big Data? Because if you can capture it, you can measure it. If you can measure it, you can analyse it. And if you can analyse it, you can draw lessons and insights from it – lessons and insights that could have a material impact on the bottom line, even change the way you look at your business.

In their recent book, *From Big Data: A Revolution That Will Transform How We Live, Work and Think* [2], Viktor Mayer-Schonberger and Kenneth Cukier describe Big Data as “the oil of the information economy”. They go on to write: “Though data is rarely recorded on corporate balance sheets, this is probably just a question of time.”

Data will only appear on your balance sheet if you start taking it seriously. It's time to get started.

Chapter 1

BIG DATA. BIG PICTURE.



1.1 The Role of Technology

To understand the opportunity Big Data affords, context matters. There are four interlocking technology trends at play today:

Mobile, putting information at people's fingertips 24/7, wherever they are

1

Social networking, changing the nature of professional relationships, increasing reach and influence

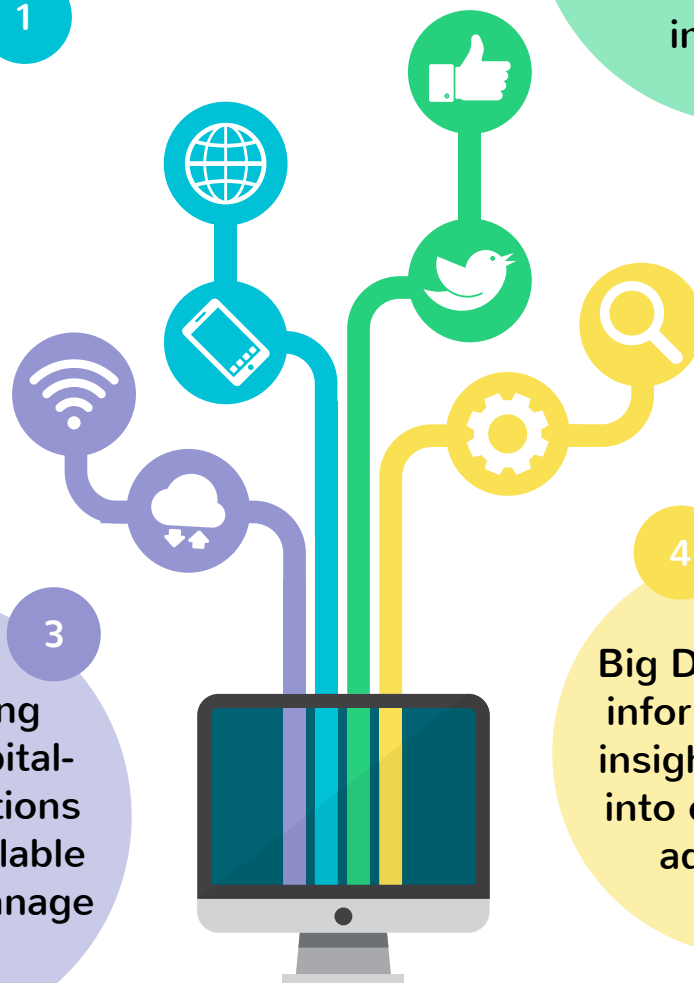
2

Cloud, making previously capital-intensive solutions affordable, scalable and easy to manage

3

Big Data, turning information into insights, insights into competitive advantage

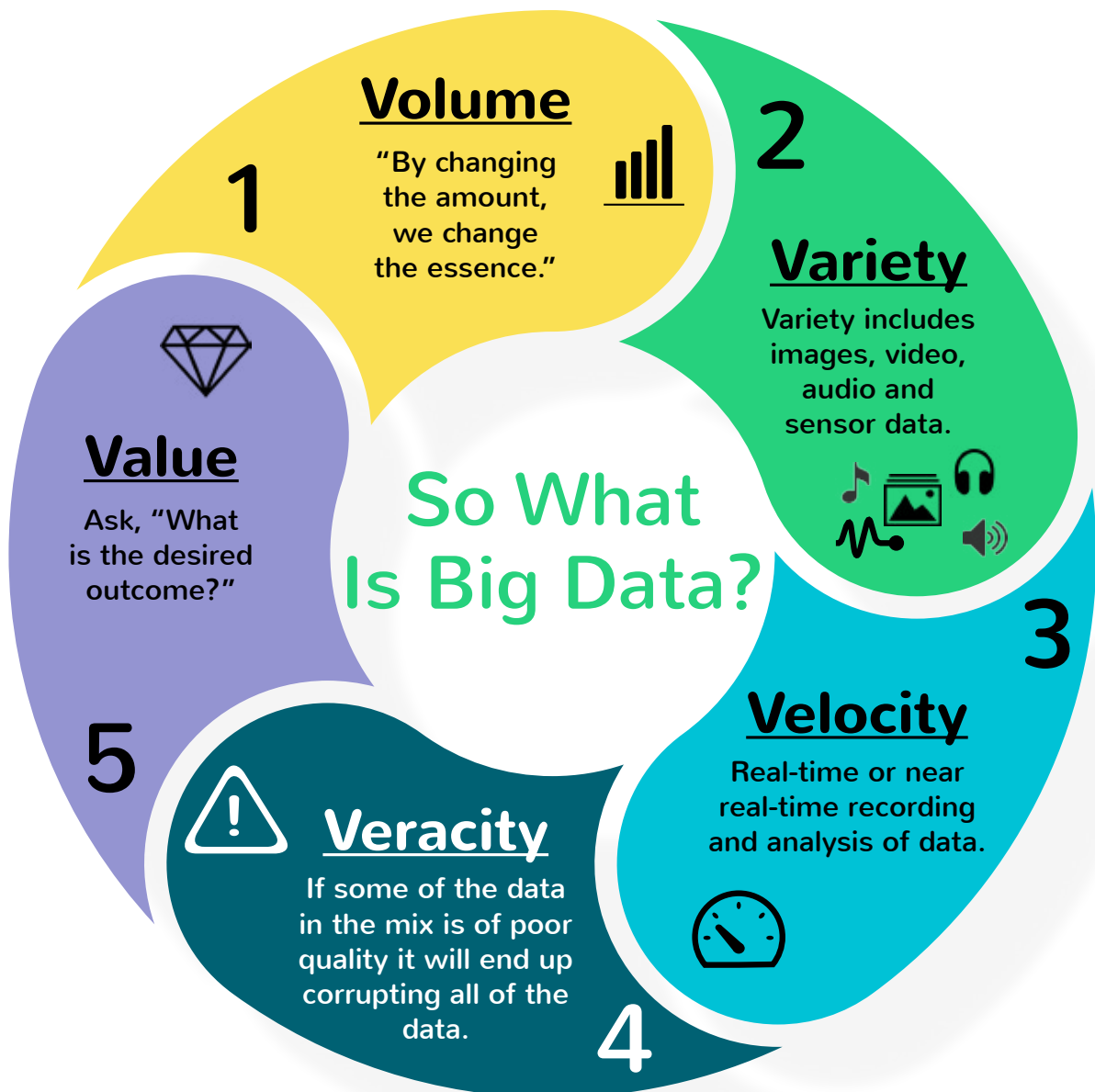
4



By combining the last of these two with ever-cheaper storage and ever-faster processing power, analytics at scale becomes available to all, regardless of how small the business. "Whereas in the past you could only analyse large volumes of data if you had a big IT budget and had big servers, now you can rent server space and you can rent the ability to analyse the data," says Bernard Marr. "Anyone with any budget can now do Big Data."

1.2 So What Is Big Data?

Although adoption of Big Data is relatively recent (and ongoing), the term itself dates back to a 2001 paper written by a technology analyst called Doug Laney. In the paper, written for his firm Meta Group, Laney noted that "current business conditions and mediums are pushing traditional data management principles to their limits." [3] He identified three characteristics that were changing the nature of data capture, measurement and analysis. He defined these as:



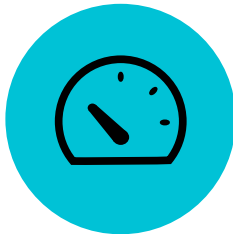


1. Volume:

Lower cost of storage meant terabytes were replacing gigabytes; petabytes were replacing terabytes, in data projects (see Glossary for an explanation of these terms). And although it is a mistake to think about Big Data solely in terms of volume, authors Viktor Mayer-Schonberger and Kenneth Cukier insist that "by changing the amount, we change the essence." They went on: "The change of scale has led to a change of state. The quantitative change has led to a qualitative one." [4]

2. Variety:

Big Data is more than the structured data that can easily slot into a spreadsheet field. Some of the semi-structured and unstructured sources that add variety include images, video, audio and sensor data.



3. Velocity:

Coupled with lower cost storage, cheaper and faster processing has made real-time or near real-time recording and analysis of data a possibility. Moore's Law dictates that processing chips double in power every 18 months. Meanwhile the amount of data coming out of fibre optic cables doubles every nine months. [5]

It is these three elements, in concert, that mark out Big Data from other forms of business intelligence. Latterly a fourth 'V' has been added:

4. Veracity:

This is an early warning system for Big Data. If some of the data in the mix is of poor quality it will end up corrupting all of the data. "Garbage in. Garbage out", as technologists say.



Clive Longbottom, an ex-Meta Group employee and now service director at Quocirca, believes that the early definition of Big Data remains appropriate to our understanding today. However, he urges the addition of a fifth 'V':



5. Value:

"Ask yourself why you are actually doing it?" says Longbottom. "Ask, 'What is the desired outcome?' not 'what is the result we want the data to tell us?'"

1.3 Why Big Data? And Why Now?

Management consultants McKinsey & Company identifies five broad ways that organisations can make Big Data work for them. [6] It can:

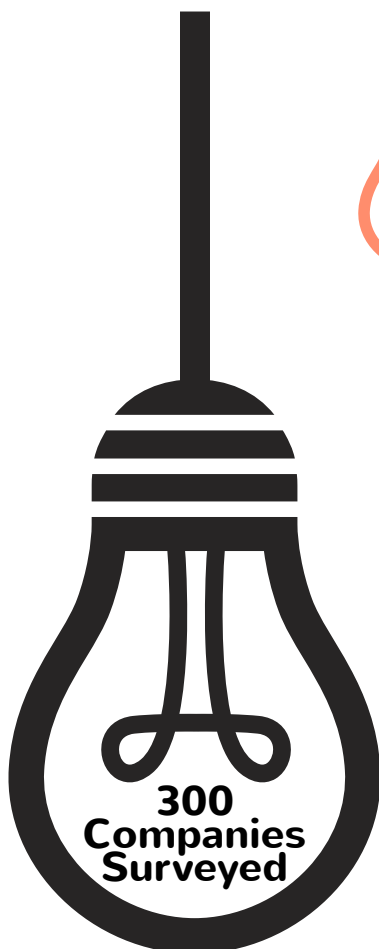
Unlock value by making information transparent and accessible

Improve the accuracy and detail of performance information

Segment customer needs and behaviour, allowing for tailored products or services

Improve decision-making

Improve development of future products and services



13%
Deploy Big
Data Projects

Some industries are already embracing these ideas. According to analysis of over 300 companies worldwide by Gartner, 13 per cent of companies have deployed Big Data projects. Communications and media companies are the most active: 53 per cent have already been doing it; with a further 24 per cent planning to do so within the next two years. Banking, insurance, transportation and healthcare are the other industries taking a lead.



Communication & media, banking, insurance, transportation and healthcare are the industries taking a lead.

And what of recruitment companies?

With some honorable exceptions, adoption of data as a means of adding value to the business has been slow. "I don't believe any company, especially in the recruitment world, can stay competitive without data," says Bernard Marr. "If they are not very data savvy they won't survive more than five years."

The threat will come from outside, says Belinda Johnson, founder of employment and research company Worklab. The democratising nature of technology means disruption is just one good idea away. "The industry won't disrupt itself," Johnson insists.

Internet disruption comes in a number of forms including through removing inefficiencies, taking advantage of audience scale and disintermediation (cutting out the middle man).

"The industry will say it's had its disintermediation already and that's been going on for 15 to 20 years," says Johnson. "The real danger for the industry is at the very point that it should be addressing the issue of data it will see the need not to because the market is really busy. Demand is up." In other words, as the global economy emerges from recession, now is the time to invest in new ways of working.

**"If they are not very data savvy they won't survive more than five years,"
Bernard Marr.**

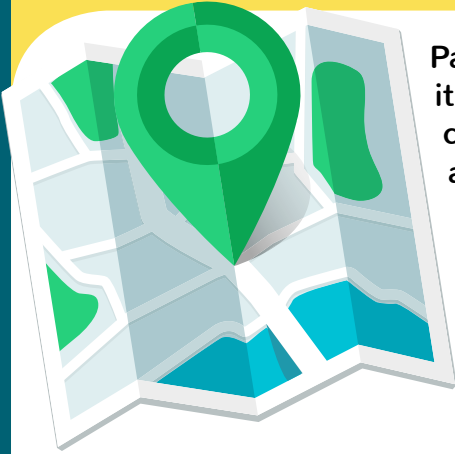
Chapter 2

BIG DATA IN ACTION



The case for Big Data is best told through the application of the technology, not the technology itself. In the next chapter we will discuss some recruitment-specific uses of Big Data, including some real-life case studies. First, some notable examples from elsewhere.

2.1 The Logistics Company



Parcel delivery and logistics company UPS has form when it comes to applying data analytics. During the Noughties it claimed to have reduced the distance its drivers covered by a mile a day. The result was an annual saving of \$US 50m (£32m, \$AU 62m) in fuel, maintenance and time. How did it do this? By, among other things, making drivers carry their keys on their fingers rather than in their pockets, and by mapping routes across US cities and towns with a minimal number of left-hand turns – in other words, a journey with the fewest turns into traffic. [7] Since 2012, UPS has been working on a telematics project that draws data from 200

sensors on each vehicle. UPS claims, as a result of this, it has reduced idling time by 206 million minutes and saved 1.5 million gallons of fuel a year.

2.2 The Tractor Company

There are few more traditional companies than John Deere, the US farming equipment manufacturer that was founded in 1837. Today it uses sensor data to detect wear and tear on its equipment, preventing malfunction by predicting when repairs need to take place. John Deere also places sensors in the soil to inform planting and harvesting decisions, and help farmers file crop insurance claims [8]. This is a company rooted in physical manufacturing that today counts on data as one of its main revenue streams.



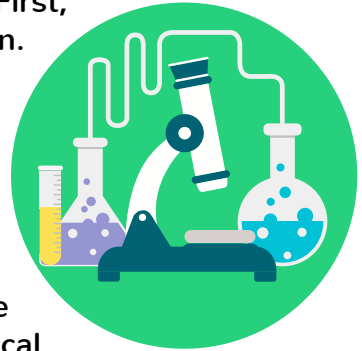
2.3 The Digital Retailer



Online auction site eBay collects information sourced from some 100 million customer interactions every day. That behaviour data is based on 200 experimental changes it makes to the user interface in an effort to improve customer engagement. It might, for example, alter image dimensions when a user first encounters an auction item. To get a sense of the scale of the operation, eBay is collecting around 12 terabytes a day. [9]

2.4 The Scientists

The clinical trial has been the method of choice in scientific research for years. Compared to Big Data analysis, however, the trial suffers in two ways. First, a clinical trial deals in relatively small amounts of information. Second, it's slow. The Clinical Sciences Centre in London is using Big Data techniques to monitor 1,600 beating hearts. Using 3D video imagery, researchers are examining the relationship between heart disease and people's genes by examining data at scale. "There are often subtle signs of early disease that are really difficult to pick up even if you know what to look for. A computer is very sensitive to picking up subtle signs of a disease before they become a problem." Dr Declan O'Regan of the Medical Research Council told the BBC. [10]



2.5 The Advertising Company



Quantcast manages digital advertising for clients including Time, the Guardian, The Economist, Wordpress and LinkedIn. By placing a measurement tag on over 100 million destinations across the web it can apply mathematical modelling to the data it collects. At scale and at speed, it builds up anonymised consumption histories and plots patterns of activity that are predictive of outcome. Working in real-time, as the page is rendering and at the point at which the advertising space is auctioned off, Quantcast and other firms like it will calculate whether a consumer matching those characteristics will be interested in the advert it is about to serve. [11]

2.6 The One That Went Wrong

One final example to prove that data forecasting doesn't always go to plan. In the run up to the 2013 holiday season, UPS predicted an 8 per cent rise in shipping volumes in the United States. It based this forecast on various datasets including the previous year's performance, expected footfall in major shopping locations, the state of the economy and consumer confidence, and weather forecasts. It prepared accordingly. In the event, there was a 37 per cent year-on-year growth in online sales in the immediate run-up to Christmas. Unforeseen bad weather, last-minute online discounting and Amazon's free shipping were just three factors that forced shoppers out of the malls and on to the web, and knocked UPS's best calculated plans on their side. [12]



Data informs, it provides signals but it can't always predict the future. Or as one industry analyst observed: "Big Data doesn't know what it doesn't know."

Chapter 3

APPLYING BIG DATA TO RECRUITMENT



In late 2013, BBC Radio 4's Bottom Line devoted a whole programme to Big Data. Explaining the phenomenon to a generalist business audience, one of the guests, Microsoft's Dave Coplin, made the following case: "The magic of all of this is not the data itself, it's what you do with it. Organisations are generating all sorts of data streams as a process of their business and what we are starting to see now is that there is a hidden value in that data. [A company] could take that data and sell it on to other providers. So for example, some transportation companies know the best way through Manchester at 5 o'clock on a Friday afternoon. Selling that to Domino's [a pizza company] for example, that's when the fun starts." [13]

As we saw in the previous chapter, Big Data can be applied in multiple ways to a variety of industry sectors. In this chapter, we will look at how it might be adapted to recruitment and, specifically, to recruitment agencies.

**"The magic of all of this is not the data itself,
it's what you do with it,"
Dave Coplin.**

3.1 Seven Ways Recruitment Agencies Should Use Data



1. Benchmark agency performance against industry averages

Recruitment Industry Benchmarking, run by Crawford Walker, does just this. By amassing 27 pieces of raw data from participating recruitment agencies and brands, RIB turns those into 35 measurements. The raw data includes basic financial information such as net profit and turnover as well information around employees and contractors including the number of placement and aggregate salaries. From this, RIB presents metrics such as total employee costs as a percentage of gross profit, average placement salary, and temp margin as a percentage of temp turnover. These metrics can be measured over time but also against industry-wide and sector specific averages. Anonymised and aggregated datasets such as these allow one recruitment agency to compare its performance with the mid-point, the median, the upper quartile and the lower quartile. This spread of what Walker calls "proper data" should help agency owners and senior management run their companies. "This is what a 'good' recruitment agency should be measuring," Walker says.

2. Assess the effectiveness of individual consultants

Using services from the likes of RIB or by analysing the data in-house, recruitment agencies can compare the earnings generated by consultants, both as a snapshot and over time. Equally, the data may throw up factors for a slow down or upturn in performance. Being able to spot such patterns is a valuable management tool.





3. Assess the suitability of candidates by analysing publicly available behaviour data

We've seen already how the choice of browser can prove an indicator of suitability. Other public domain information from social networks and the broader web is there to be analysed to help inform decision making. One software company in the United States, for example, helps recruit computer programmers by assessing any publicly available code, discovering whether it gets reused or if it's well-regarded by other coders. It will also look at how those programmers communicate their ideas online.

[14] Meanwhile, perhaps the most notable use of data to identify talent featured Billy Beane, the general manager of Oakland Athletics baseball team. Michael Lewis turned the story into a book called Moneyball [15] and the book was turned into a film of the same name starring Brad Pitt [16].

4. Reduce employee churn by detecting detrimental trends

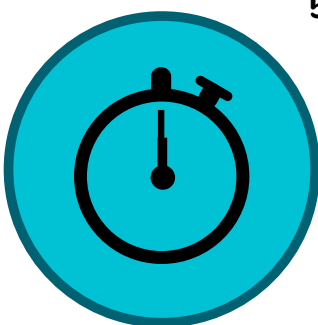
Whether placing permanent staff or contractors on a project basis, looking for patterns and trends that will help prevent unacceptable employee turnover rates is a value added service clients would be prepared to pay for. Take the example of airline catering service, Gate Gourmet. Churn rates at its Chicago O'Hare Airport operation were running at 50 per cent. By examining a range of internal indicators, including performance reviews and point of sale data, as well as external indicators such as demographics, comparative compensation, traffic levels and transportation availability, it was able to spot some significant patterns. Among the key reasons employers were leaving was the lack of accessible public transport. By identifying and addressing issues like this directly, Gate Gourmet was able to bring churn rates down to 27 per cent. [17]



5. Predict how quickly a position is likely to be filled

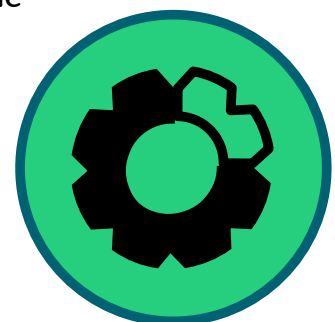
Again, by using in-house data alongside benchmarking tools and external indicators (economic forecasts, sector-specific sentiment analysis), forecasting future need becomes more forensic. Worklab's Belinda Johnson, former knowledge and insight director at human resource consulting firm Randstad, says: "Where they do have good relationships, recruitment agencies should be working out what it is that they could provide now that will help the client. Those services could then

be used to lock the client in (to some form of preferential usage) or to realise and monetise the actual value for the intelligence."



6. Predict need by sector and/or region

In the same vein, use a variety of data sources to make forecasts. In one example of this type of forecasting, IBM meshed data from its client billing and HR databases to detect dozens of trends that informed hiring needs. [18]



7. Measure the suitability of job adverts or job descriptions

How, for example, does the copywriting on an advert skew against certain demographics? By analysing the copy and comparing the quality and quantity of responses by demographic (and comparing those over time and with adverts for similar roles), patterns can be observed and improvements made. If you are attracting fewer female graduates than you need, data may solve the puzzle.



Benchmark, Assess, Reduce, Predict, Measure



Chapter 4

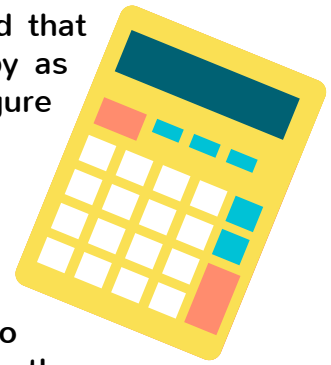
DEPLOYING BIG DATA



4.1 Calculating Return on Investment (ROI)

Management consultants McKinsey & Company has estimated that some retailers have realised increases in operating margins by as much as 60 per cent [19]. Unfortunately, there is no equivalent figure for the recruitment industry.

Instead, recruitment agencies need to make a judgment call. For example, etzTechnologies offers a subscription to its etzInsights product for several thousand pounds a year. "It's a relatively small investment for the agency that has already got the skills [to analyse the data]," says head of global sales Gordon Webb. For those without the skills in-house, allow for three times the expense once you've recruited someone with the right analytical skills.



There's another potential complexity to throw in here: given that some of the best value from Big Data comes from discovering something unexpected, it can prove difficult to embark on a project knowing exactly what kind of return you will get at the end of it.

Ultimately this means there will be one route for the risk averse, and another for those willing to roll the dice. Bernard Marr, for one, recommends the pragmatic approach. "Some businesses can afford to experiment but for smaller ones the right model is to figure out what are the questions that you are looking for answers."

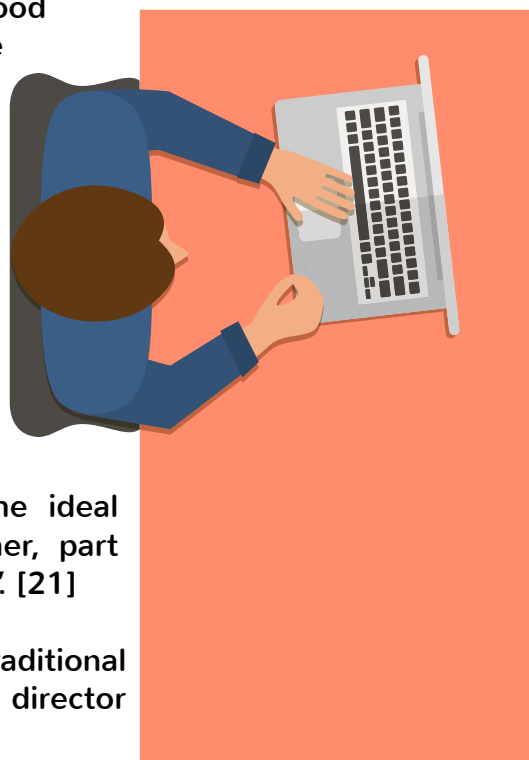
4.2 Who is Your Chief Digital Officer?

"The data is often free or cheap, the hardware and software are free or inexpensive, but the people are expensive or difficult to hire."

So writes Thomas Davenport, author of *Big Data at Work: Dispelling the Myths, Uncovering the Opportunities*. [20] The good news, he insists is that it won't be long before universities are "churning out qualified students by the tens of thousands" and averting a labour shortage that would kill off Big Data in its prime.

Until then, what are the types of skills you need to help you manipulate, measure and analyse your data ensuring you realise its value? Davenport argues that the type of people needed differ from conventional analysts. "They are more facile with data, more experimental, more focused," he writes. Meanwhile Konrad Feldman, CEO of Quantcast has described the ideal candidate as being "part computer programmer, part statistician, part anthropologist, part story teller". [21]

If you are looking for those skills, beware the traditional data scientist, argues Clive Longbottom, service director



at Quocirca. “The commercial capabilities of data scientists tend not to be very strong,” he says. Data scientists tend to be more interested in the “intricacies and elegance” of the data. Instead, employ someone who is “commercially viable”, someone who will acknowledge not just that “it’s a great looking graph but knows what it means to the bottom line.”

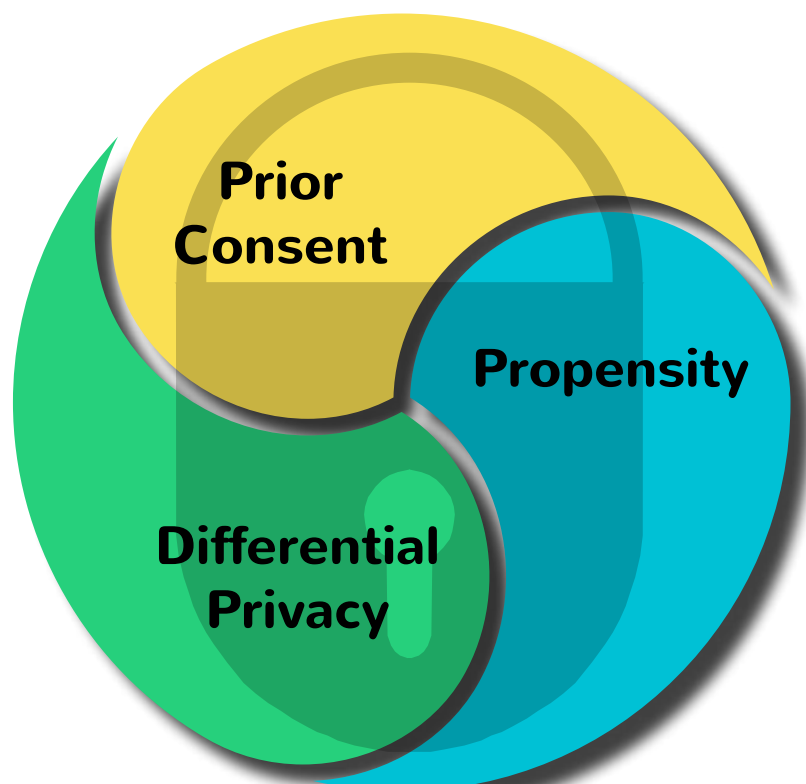
Gordon Webb suggests a practical way to approach a likely skills gap. Look no further than the finance director, he says. Outsource the accounting function to the likes of KPMG and turn your FD into your chief digital officer. “The financial director will migrate from being the day-to-day financial manager to the person who spends the majority of their time analysing the data.”

4.3 Privacy, Compliance and Moral Dilemmas

Handle with care. That’s the advice that should accompany any data project.

Consider the forthcoming EU Data Protection Regulations which will impose a unified law across 28 European countries and will be applicable to any business holding data in those countries and / or holding data about citizens of those countries [22]. Even if your business is located outside Europe, so long as you do business in Europe you will need to comply. Moreover, many of the fundamentals of the EU data protection regulations are reflected in other regions including Australia and the United States.

That those regulations are taking longer than planned to be agreed tells you something of their complexity but also of the political nature of data and its importance in the modern economy. Whatever the final shape the laws take, penalties for misuse will be significant – currently the plan is to impose fines for breaches of up to 5 per cent of annual global turnover or \$US 110m (£72m, \$AU 138m), whichever is the larger figure.



Prior Consent

One of the overarching principles of data use, regardless of geography, is “prior consent”. In other words, permission is granted on the basis that the intended purpose of data collection is clearly stated. For some Big Data projects this will be problematic. Why? Because sometimes you don’t know what you’re looking for until you’ve found it. Prior consent may be the friend of the consumer but it is the enemy of serendipity.

Another area of complexity – and possible blurring of ethical boundaries – is what Viktor Mayer-Schonberger and Kenneth Cukier call “propensity”. [23] They point to one of the most interesting applications of Big Data, namely the ability to forecast likely behaviour. By plotting myriad structured and unstructured datasets it’s possible to detect patterns of behaviour that would otherwise be invisible. You might, for example, be able to identify patterns of fraud, the likelihood that someone is going to default on a loan or that they will ultimately prove an unsuitable candidate for a role. The trouble with propensity is that it potentially penalises people before they have acted. Good practice means working hard against this.

Propensity

There’s one final data dilemma to consider and it’s filed under “differential privacy”. Consider that most responsible organisations handling data will anonymise information to protect an individual’s privacy while still being able to identify some useful characteristics. This piece of data in isolation will not identify an individual. However, when taken together with two or more other pieces of data, it suddenly becomes possible to triangulate that data and identify the individual. At a stroke anonymised data becomes personally identifiable data (PII).

Differential Privacy

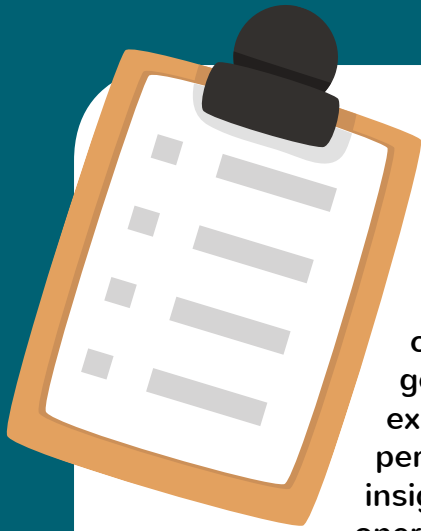
Ultimately, for the individual there is a trade-off between convenience and the degree to which you are willing to share some of your personal information and habits. But this presupposes you are in control of that trade-off.

None of these issues are insurmountable and none should stop you from embarking on a data project. Nevertheless, privacy and consent should be taken seriously.

Chapter 5

THE BIG DATA RECRUITMENT CHECKLIST





Whether you are new to analytics projects or feeling inspired to deploy data in different ways, here are some key tips to follow:

1. Start with the business not the data

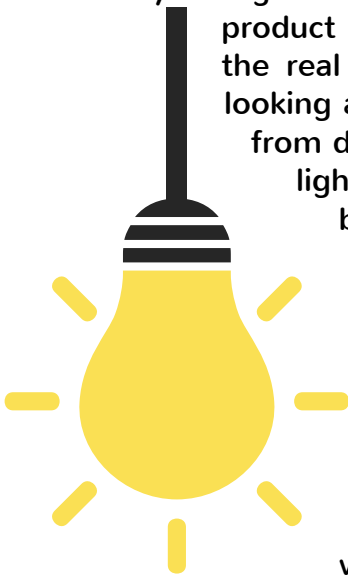
So says Bernard Marr. Organisations need to marry the application of data with underlying business goals. By applying the data to the existing strategy, you can “improve performance and integrate those insights to improve day-to-day operational efficiency”. [24] Clive

Longbottom of Quocirca agrees. “Make sure you’re not just doing things because the CEO or CIO has read something in a magazine and has popped his head around the corner and said, ‘Why aren’t we doing Big Data?’”



2. Be open to discovery

The beauty of Big Data projects is the opportunity to find out things you may never have considered before. In discovery mode, data can help you improve existing processes, dramatically change the way you do things or even open up the possibility of new product lines, new services and new business units. “That’s one of the real strengths of the Big Data approach,” says Longbottom. By looking at data with less structure than before or a set of data drawn from disparate sources you are more likely to have “that 60 kilowatt light bulb moment”, says Longbottom. Serendipity is a powerful business tool too. Embrace it.



3. Don’t discount the data you already own

While external data sources matter (see below), there remains enormous value in gathering, measuring and applying the data you have already. One of the first tasks you should undertake is to make a list of all the data you already collect; the data you could easily collect and then the data you would like to collect. Make a list of all the datasets you could, with a little effort, start recording on a weekly, monthly and quarterly basis. This might be basic financials but also placements by sector, company, geographical spread and so on.

4. Look outside the organisation

Value lies in being able to compare and benchmark in real time and over time. That means accessing external data. “To get a true idea how your company is performing, you’ll only know by looking in the context of the marketplace. Not the marketplace six months ago, not the marketplace 12 months ago but the marketplace now,” says Crawford Walker, CEO of Recruitment Industry Benchmarking. Those that only look inward are, says Walker, like the athlete who only ever trains alone. “He thinks he’s doing well until he goes up against the competition.”



5. Don't assume data is the preserve of IT

Or any other department for that matter. The link between data collection, analysis and business decision making means collaboration, not isolation, is the only way to use data successfully.



6. Tell stories with data

Storytelling is more powerful than numbers alone. This could be a narrative description told in management meetings, a presentation for all of staff, a passage in the annual report or on the company website. Equally, telling stories means you should...

7. Use data visualisation tools

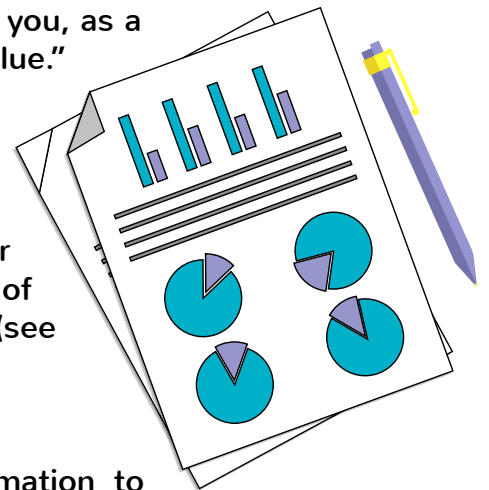
Deploy dashboards and infographics to communicate key messages to key people. Some organisations take this advice very seriously indeed. The US consumer goods firm Proctor & Gamble for example, has created a "Decision Cockpit" which displays key information in graphical form and is accessible to 50,000 employees via their desktop computers [25]. What matters in data visualisation, says Thomas Davenport, is "commonality" rather than "creativity". "If you can establish a common visual language for data, you can radically upgrade the use of the data to drive decision-making and action," Davenport writes. [26]

8. Get into the data habit

Crawfurd Walker urges recruitment consultants to get out of their comfort zone. That means using data as a matter of course, not just for the monthly management accounts or the annual results. "This type of information is where you, as a business owner or senior manager, can add significant value."

9. Learn how to read the numbers

"There's no point in going to get the data if you don't know what it means once you've got it," notes etz Technologies' Gordon Webb. There are a number of technologies available that can help the process of understanding the data, including the etzInsight tool (see Appendix II).



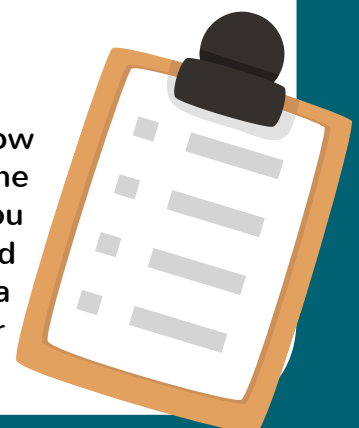
10. Share the insights

"I know of people who keep the information to themselves because they know how valuable it is," notes Crawfurd Walker. Avoid this temptation. By sharing data insights with colleagues and discussing potential consequences, the whole business will benefit.



11. Get reading

Immerse yourself in the subject sufficiently so you know the right questions to ask and can spot when someone is selling you a line. "Don't just jump in because you will fail," says Clive Longbottom. "Instead read and start thinking about how you might handle data in a different way." Bernard Marr adds: "Look at the other industries and uses out there. Learn from those."



CONCLUSION

The first known tables of public health data date back to the 17th century when John Graunt, a proto-demographer, monitored plague-related mortality in London. Graunt's work, *Natural and Political Observations Made upon the Bills of Mortality* (1662) featured the first life table, presenting probabilities of survival among various demographic groups [27]. His work provided the template for today's census collections around the world and provides a compelling precursor to contemporary Big Data projects. It demonstrates, too, that nothing is entirely new in the world of data.

Even in the modern era some of the concepts we've been discussing are not new. Author Thomas Davenport [28] lists six generations of data analysis since the 1970s – decision support, executive support, online analytical processing (OLAP), business intelligence, analytics and, now, Big Data.

What makes Big Data different is not only the scale (volume) but also the mix of structured, semi-structured and unstructured sources (variety) and the speed with which the information is processed and analysed (velocity).

Whether a full-scale Big Data project is right for you, or whether it is a series of smaller scale analytics programmes, don't ignore data. As we've explored in this eBook, the case for data is compelling. It is your competitive advantage. Use it.

"The case for data is compelling. It is your competitive advantage. Use it."

Appendix I: Glossary of terms

Analytics

The examination of data and statistics in an effort to spot potential trends and the effects of certain behaviours.

Big Data

The exploration of data that is traditionally characterised by its volume, variety and velocity. See Chapter 1 for a more in depth explanation.

Cloud computing

A network of remote computer servers used to store, manage and process data. Access is typically provided over the Internet.

Datafication

Examining activities, actions and behaviours of people and machines and turning these into computer data to be measured and analysed.

Datasets

A collection of information that has individual units of data within it, formatted in a uniform way that allows for manipulation and analysis.

Internet of things

A network of physical objects that have been embedded with sensors and software to record activities and behaviours. The data collected is transferred over the Internet.

Personally Identifiable Information (PII)

A piece of data that, alone, can be used to identify an individual.

Petabyte

A unit of information. It is the equivalent of one thousand million, million bytes.

Sensor data

Implanted into a device or piece of machinery, the sensor records activity or detects changes in behaviour.

Sentiment analysis

Identifies and categorises words and phrases by the response (positive, negative or neutral) expressed.

Structured data

Data that has been entered into a fixed field within a spreadsheet or relational database. It is data that is readily searchable and analysed.

Terabyte

A unit of information. It is the equivalent of one million, million bytes.

Unstructured data

By contrast to structured data, unstructured data doesn't reside within a traditional relational database or spreadsheet. It is unlikely to have a pre-defined data model by which it can be organised. Images and social media messages are examples.

Appendix II: Introducing etzInsights

etzInsights offers a comprehensive range of detailed and accurate datasets designed to enlighten and inform business decision making. Available as a data hosting service ready to plug into third-party visualisations solutions such as Tableau, etzInsights stores valuable pieces of information about clients, contractors and third party suppliers.

etzInsights also processes and presents data on internal operations throwing up actionable metrics such as timesheet volumes, margins per contractor, highest billers, highest revenue generating contractors and much, much more.

Appendix III: Sources

Interviews

Clive Longbottom, service director, Quocirca – 16 February 2015
Gordon Webb, head of global sales, etz Technologies – 19 February 2015
Crawfurd Walker, CEO, Recruitment Industry Benchmarking – 24 February 2015
Bernard Marr, author of Big Data: Using Smart Big Data Analytics and Metrics to Make Better Decisions and Improve Performance – 2 March 2015
Belinda Johnson, founder, Worklab – 3 March 2015

Introduction

[1] Big Data: Using Smart Big Data, Analytics and Metrics To Make Better Decisions and Improve Performance, by Bernard Marr (2015) <http://eu.wiley.com/WileyCDA/WileyTitle/productCd-1118965833.html>

[2] From Big Data: A Revolution That Will Transform How We Live, Work and Think, by Viktor Mayer-Schonberger and Kenneth Cukier (2013) <https://www.hodder.co.uk/books/detail.page?isbn=9781848547902>

Chapter 1: Big Data. Big Picture

[3] 3D Data Management: Controlling Data Volume, Velocity, and Variety, Meta Group, 6 February 2001
<http://blogs.gartner.com/doug-laney/files/2012/01/ad949-3D-Data-Management-Controlling-Data-Volume-Velocity-and-Variety.pdf>

[4] From Big Data: A Revolution That Will Transform How We Live, Work and Think, by Viktor Mayer-Schonberger and Kenneth Cukier (2013) <https://www.hodder.co.uk/books/detail.page?isbn=9781848547902>

[5] The New Digital Age: Reshaping the Future of People, Nations and Business by Eric Schmidt and Jared Cohen (2013) http://books.google.co.uk/books/about/The_New_Digital_Age.html

[6] Big data: The next frontier for innovation, competition, and productivity, McKinsey & Company, 2011 http://www.mckinsey.com/insights/business_technology/big_data_the_next_frontier_for_innovation

Chapter 2: Big Data in Action

[7] When in doubt: UPS avoids left turns, June 2012 <http://compass.ups.com/UPS-driver-avoid-left-turns/>

[8] What Uber and Lady Gaga Can Teach You About Analytics, 25 November 2014 <http://smartdatacollective.com/bernardmarr/283251/what-uber-and-lady-gaga-can-teach-you-about-analytics>

- [9] eBay using big data analytics to drive up price listings, 22 October 2013 <http://www.v3.co.uk/v3-uk/news/2302017/eBay-using-big-data-analytics-to-drive-up-price-listings>
- [10] Doctors store 1,600 digital hearts for big data study, 15 February 2015 <http://m.bbc.co.uk/news/science-environment-31166170>
- [11] Big Data. The Bottom Line, BBC Radio 4, 5 October 2013 <http://www.bbc.co.uk/programmes/b03bs386>
- [12] Behind UPS's Christmas Eve Snafu, 26 December 2013 <http://www.wsj.com/articles/SB10001424052702303345104579282432991595484>

Chapter 3: Big Data in recruitment

- [13] Big Data. The Bottom Line, BBC Radio 4, 5 October 2013 <http://www.bbc.co.uk/programmes/b03bs386>
- [14] How Big Data Is Playing Recruiter for Specialized Workers, New York Times, 27 April 2013 <http://www.nytimes.com/2013/04/28/technology/how-big-data-is-playing-recruiter-for-specialized-workers.html>
- [15] Moneyball, Wikipedia <http://en.wikipedia.org/wiki/Moneyball>
- [16] Moneyball, IMDB <http://www.imdb.com/title/tt1210166/>
- [17] How Big Data is taking recruiters from "I think" to "I know", 2014 <http://theundercoverrecruiter.com/big-data-recruiters/>
- [18] How Big Data is taking recruiters from "I think" to "I know", 2014 <http://theundercoverrecruiter.com/big-data-recruiters/>

Chapter 4: Deploying Big Data

- [19] Big data: The next frontier for innovation, competition, and productivity, McKinsey & Company, 2011 http://www.mckinsey.com/insights/business_technology/big_data_the_next_frontier_for_innovation
- [20] Big Data at Work: Dispelling the Myths, Uncovering the Opportunities, by Thomas H Davenport (2014) <http://www.tomdavenport.com/books/>
- [21] Big Data. The Bottom Line, BBC Radio 4, 5 October 2013 <http://www.bbc.co.uk/programmes/b03bs386>
- [22] Protection of personal data, European Commission <http://ec.europa.eu/justice/data-protection/>

[23] From Big Data: A Revolution That Will Transform How We Live, Work, and Think, by Viktor Mayer-Schonberger and Kenneth Cukier (2013) <https://www.hodder.co.uk/books/detail.page?isbn=9781848547902>

5. The Big Data Recruitment checklist

[24] Big Data: Using Smart Big Data, Analytics and Metrics To Make Better Decisions and Improve Performance, by Bernard Marr (2015) <http://eu.wiley.com/WileyCDA/WileyTitle/productCd-1118965833.html>

[25] How P&G Presents Data to Decision-Makers, Harvard Business Review, 4 April 2013 <https://hbr.org/2013/04/how-p-and-g-presents-data/>

[26] Big Data at Work: Dispelling the Myths, Uncovering the Opportunities, by Thomas H Davenport (2014) <http://www.tomdavenport.com/books/>

Conclusion

[27] John Graunt and the birth of public health statistics <http://www.academia.dk/Blog/john-graunt-24-april-1620-18-april-1674-was-2/>

[28] Big Data at Work: Dispelling the Myths, Uncovering the Opportunities, by Thomas H Davenport (2014) <http://www.tomdavenport.com/books/>



smarter recruitment solutions



etztec.com