

Big data, better public services

Talking Points

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Introduction

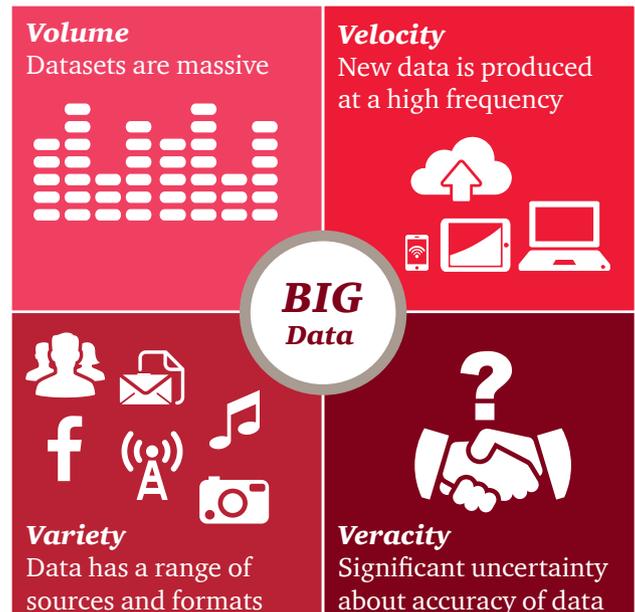
Big data and the use of data analytics now provide exciting new ways of working – harvesting better business intelligence and insights and enabling more targeted and earlier interventions. And greater use of Big data is one of the cross-cutting issues at the heart of Spending Review 2015¹ (SR15) ‘to drive the next stage of efficiency and reform across government.’ Although, along with the potentially huge benefits of exploiting ‘Big data’ for both business and public service delivery, go some very big risks if that exploitation is done badly or misfires.

But what does the term ‘Big data’ really mean? There really is no mystery, just MORE data than we’ve ever had access to before, because of the multitude of ways in which data about each of us is now generated, stored, linked and analysed.

Until recently data was commonly understood as something that was held in a closed government or company database, a way to track and analyse information captured through forms, email or your CRM system. So, in other words, data that you define, collect and control. This kind of data is usually understood as ‘structured data’,² easily recognisable and manageable.

But now there are multiple additional ways that data is generated – through search engines, smart phone applications and social media. This is referred to as ‘unstructured data’ because it is usually not organised in any predefined manner. But it can provide a hugely rich pool of information about customer needs, preferences and behaviour.

What makes **Big Data** new and different is the 4Vs:



¹ See www.pwc.co.uk/industries/government-public-sector/2015-and-beyond/reform/looking-towards-the-next-spending-review.html for further information.

² ‘A Quick Guide to Structured and Unstructured Data’, Smart Data Collective, June 2014. www.smartdatacollective.com/michelenemschoff/206391/quick-guide-structured-and-unstructured-data

What is Big data when it comes to healthcare?

The digital age has led to an explosion in the data available in healthcare. This includes:

- **Electronic medical records** – individual patient details and overall treatment pathway
- **Social media** – online communities contain valuable insights and allow direct communication with consumers
- **Mobile apps** – health applications produce data on symptoms, activities, medicine usage...etc.
- **Personal medical devices** – often wearable devices that generate data on an individual's activities and medicine usage
- **Genomic Data** – data on an individual's genetic make-up
- **Logistics data** – show detailed timing information for orders and deliveries in real time
- **Clinical trial data** – this is shared more prolifically within the healthcare industry
- **Market intelligence** – tracking performance and commercial activities (internal and competitor)

The prize of Big data is the opportunity for health providers to use it to create a system which predicts patient pathways and operates across the whole healthcare economy.



But as well as the opportunities and potential value, it's important not to underestimate the risks, which are inter-linked. Recent high profile data losses from private sector organisations in many countries demonstrates most vividly and recently the impact on reputation where **data security** is not in place. It is hard to exaggerate how uneasy many public service users may feel about giving their data whether to private or public service providers. In this regard, perceptions arguably matter more than reality: many will remember the reverberations throughout government when HMRC lost child benefit discs. It is a brave Secretary of State or Permanent Secretary who puts the benefits of data exploitation ahead of data security.

There is also an issue of a **lack of public trust** which is fundamental. Put at its simplest, the public often does not trust big users of data (whether they be government, the supermarkets or the banks) to use their data for genuine public good as opposed to in the interests of the organisation. Even the charity sector is no longer immune from such criticism; witness the reaction to the news that several large charities had been selling lists of their donors both to other charities and to commercial providers. As such, there can be **public cynicism** where the public doesn't believe that much of the data that providers capture is actually being used for their benefit. More on some of these risks later, but what of the opportunities?

Realising the value of public sector data: an intangible opportunity?

In the 2015 Spending Review, the Chancellor challenged government departments to “examine their assets and consider how they can be managed more effectively.”³ Big data as an intangible asset has a key role to play in this debate, generates a wider range of opportunities for service innovation and fosters economic growth, as we’ve found in the world of local government (see Box).

³ HMT, 2015, A country that lives within its means: Spending Review 2015, p.20.

⁴ ‘iUrban: innovative city strategies for delivering sustainable competitiveness’ PwC, April 2014. www.pwc.com/gx/en/psrc/global/assets/pwc-innovative-city-strategies-for-sustainable-competitiveness.pdf

Case Study – iUrban – Inspire – Innovate – Implement⁴

The convergence of digital technologies – the diffusion of smart personal devices, data-sharing platforms, ubiquitous and cloud computing – is opening up new possibilities for the delivery of urban services while also creating economic and innovation opportunities in cities. Indeed, many cities are increasingly nurturing open data strategies, i.e. making local data on services (e.g. water and transport flows, planning, the built environment, parking and waste collection) freely available to wider audiences, such as businesses, researchers, entrepreneurs and citizens at large.

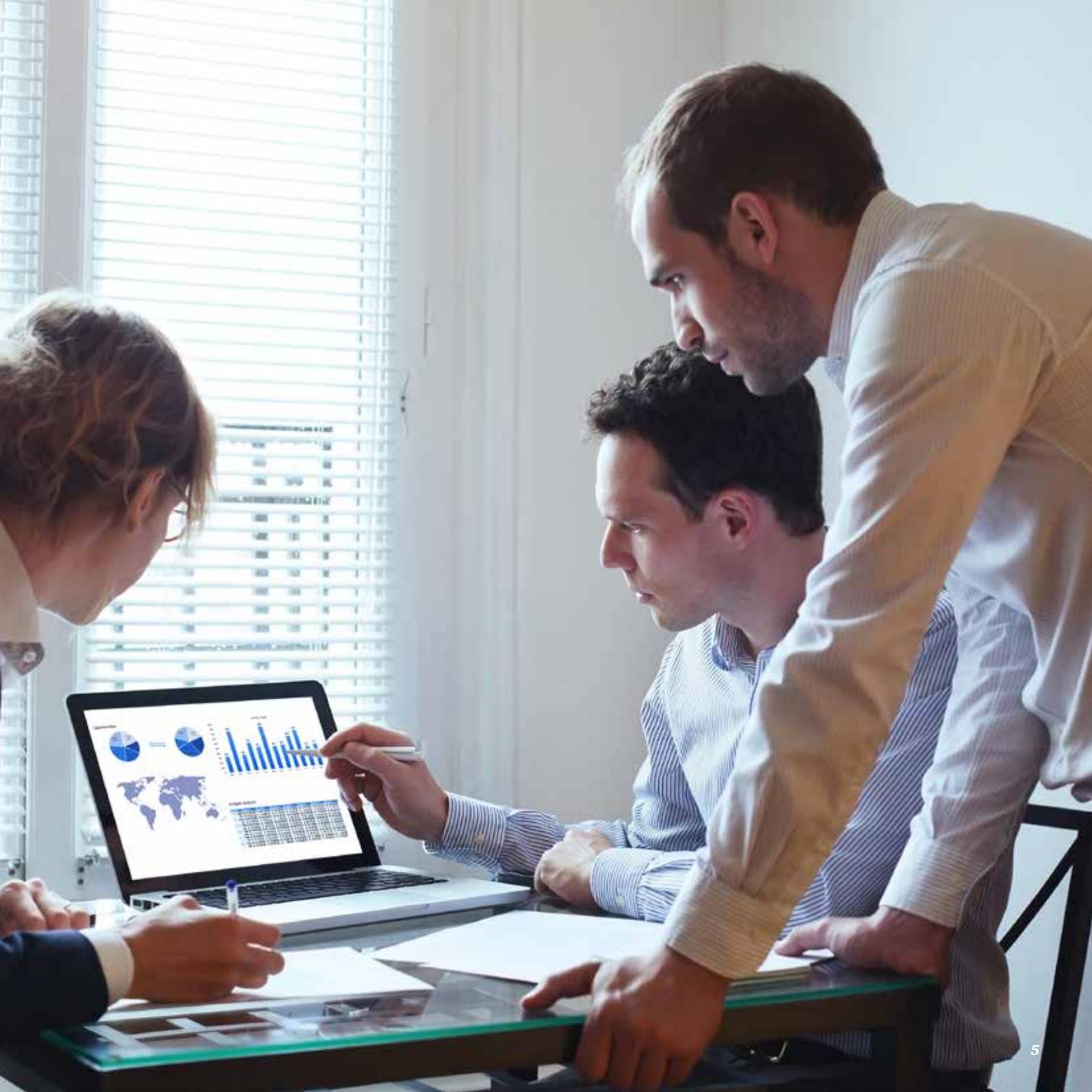
Opening up city data can contribute to a city’s sustainable competitiveness in many ways, including:

By increasing democratic participation, accountability and transparency: With more (and more transparent) information about the city’s local government actions, public decision making becomes more accountable and citizens have more opportunities (and incentives) to be actively involved in urban affairs.

By spurring innovation and new business opportunities: Wider access to city data makes it possible to bring together companies, researchers and entrepreneurs who collaborate to solve city problems, in an ‘open innovation’ fashion. With open data, a city’s challenges can involve everybody in finding a solution. Many new technology solutions and urban ‘apps’ are being developed with open city data, leading to new commercial opportunities.

By improving a city’s service provision: Ultimately, open data – and the new solutions developed from it – can be used to challenge service delivery models (e.g. water, electricity and public transport), and help find new ways to deliver more efficient solutions. The open data movement is still in the early stages, but is already delivering results in cities, such as Dublin and Helsinki. In other cities, such as Manchester, open data initiatives are increasingly intertwined with new generation ‘smart city’ and umbrella-like digital strategies.

Our study suggests, however, that implementing open data initiatives in cities is not without its challenges and requires a number of key enablers: distributed leadership, prioritisation, choosing the right scale while involving private companies, grassroots movements and agile brokers within the municipal administration.



How can public bodies make best use of such data?

Listening and analysis skills

'The customer is king' is one of the founding pillars of business, but now they hold ever more power. And this applies to citizens using public services too. Everyday across the web millions of conversations are happening and users have multiple ways of expressing their opinions. Public bodies themselves are often generating huge amounts of data in their interactions with the public. Transport for London⁵ provides just one example of how Big data is being used to improve services for the public, using the data collected from its Oyster card.

For the most part, users are telling public service providers exactly what they want but are they really listening to them? Simple analytic tools⁶ will tell you very quickly the basics such as what organic search terms are driving people to view the organisation's website and more importantly what happens when they do find your organisation. Are they able to complete their transactions? At what point are they dropping off from the site? All of which translates into real cost as their failure rate turns into more expensive ways of transacting (by phone, email or mail).

Using analytics you can also learn so much more now about service users – their age, gender and geographic location, how they accessed the organisation's content (via PC, Laptop or Mobile) and crucially how long they engaged with the content. Additionally, it can identify issues as they arise, allowing public service providers to address them before they become large-scale problems.

According to a recent report,⁷ about 75% of available data is 'unstructured' lying outside the control of corporations and companies being generated by users across social platforms such as Facebook, Twitter, YouTube and SMS. So data analytics skills across these platforms is becoming an increasingly important capability for any public service provider.

But analysing social sentiment and integrating with hard business intelligence requires a new type of approach, something which David Armano from Edelman Digital describes as synthesising.⁸ In an analogue age we would have understood this as combining quantitative and qualitative analysis through market research, focus groups and surveys. According to Armano good synthesisers can filter through ambient noise and distil thinking into clear and actionable insight to inform innovative thinking and problem solving.

This requires more focus on building the skills and capacity to make the most of data and developing fresh approaches to generate new insights, as is starting to happen in local government.

⁵ 'How Big data and The Internet of Things Improve Public Transport In London', Forbes, May 2015. www.forbes.com/sites/bernardmarr/2015/05/27/how-big-data-and-the-internet-of-things-improve-public-transport-in-london/

⁶ 'How to use Google Analytics to Create Killer Content', American Express Open Forum, September 2013. www.americanexpress.com/us/small-business/openforum/articles/how-to-use-google-analytics-to-create-the-ultimate-content/

⁷ 'Big data: Are you ready for blast-off', BBC, March 2014. www.bbc.co.uk/news/business-26383058

⁸ 'Are you a synthesizer', David Armano, August, 2007. darmano.typepad.com/logic_emotion/2007/08/are-you-a-synth.html

Data analytics and business intelligence – new skills and capacity to provide insight⁹

In the UK, a number of councils are successfully using sophisticated segmentation techniques to develop a deeper, more granular understanding of the behaviours, needs, demands and preferences of different customer groups (see Figure 1).

Once a clear view of different customer segments is developed, this analysis can be used to start to build a picture of the ‘cost to serve’ of different customer groups. This analysis in itself can drive innovation in service delivery as typical consumption paths (or customer journeys) are mapped and understood.

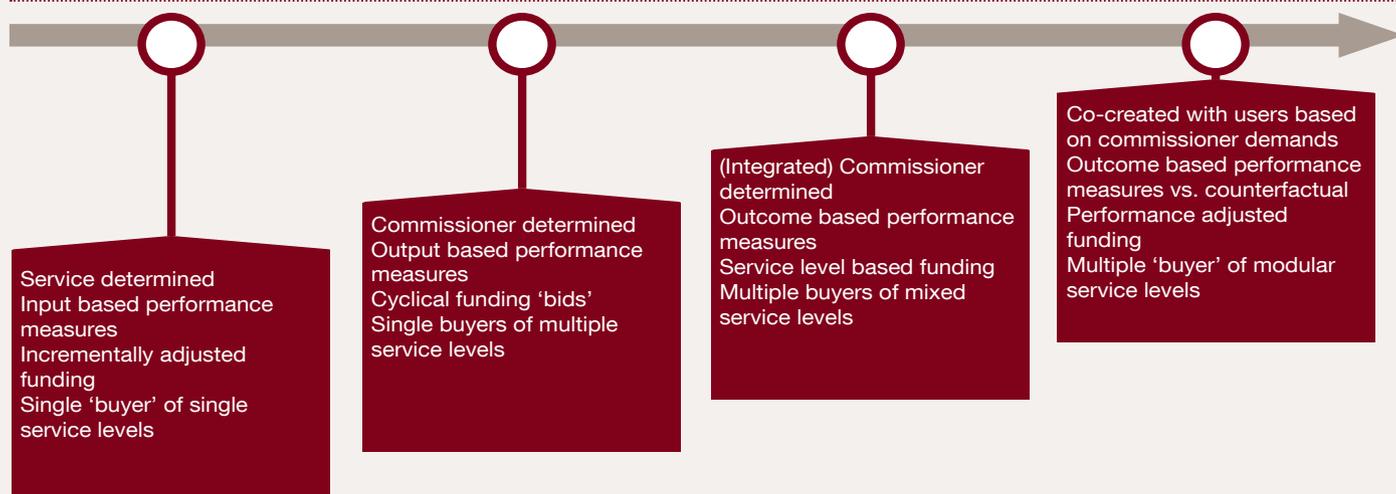
But the information councils have today focuses mainly on quantity e.g. how many people experience a service, while sometimes there is information on quality e.g. whether people had high levels of satisfaction.

However, this operational data rarely provides insights on, for example, whether investing in libraries improves children’s school performance or if access to quality open spaces encourages exercise and reduces demand on health services and ultimately saves public money. And crucially, it doesn’t tend to help evaluate what happens if public spending needs to be reduced by ten or twenty percent.

Evidence is required to show the relationship between inputs, outputs and outcomes, with more emphasis on the scientific method – counterfactual evidence to show the impact of investment in an activity against a ‘base case’.

Commissioners need, over time, to build up a picture of what works and what doesn’t in different situations, enabling them to commission services in much more effective ways.

Figure 1: Segmenting public service users



⁹ See www.pwc.co.uk/industries/government-public-sector/insights.html for more information.

Making real time decisions

Unstructured data sources are providing intelligence not only for long term planning and improvement of services but perhaps much more importantly, and closer to the hearts of public sector agencies, in day-to-day operations. Nowhere is this more evident than in the area of emergency response services.

The use of social data in this sector has risen to prominence at times of emergence in developing countries like Haiti.¹⁰ But it is increasingly being used by public authorities in the UK and has been recognised in LSE research¹¹ as a significant part of emergency prevention. Their research suggests that during unpredicted events local authorities are likely to tweet extensively using hashtags such as #snow, #alert, #gritters, #police or #weather.

Most of these emergencies are related to bad weather with tweets informing the public about the availability of services, issuing warnings, calling for information, justifying the use of available resources

(e.g. gritters) and responding to questions. A significant proportion of tweets related to emergencies are posted from mobile devices and during out-of-office hours. Of particular note are the ways in which Twitter seems to be enabling new forms of collaboration between public authorities and citizens in the context of unexpected events and beyond.

The ability to distinguish noise from signal¹² is, of course, vital in these situations as misinformation can be transferred at the speed of light and social sentiment can be difficult to get absolutely right. Machines are not great with irony or humour, for example, but technology is improving all the time. Tracking and integrating social media sentiment into your analytics gives you an opportunity to integrate real customer voice as it's happening, allowing organisations to engage, learn and improve their product and service offering.

Case Study – Blue Light Camp

Bluelight Camp is an annual two day conference for the Fire and Emergency Services across the UK. Sessions include the latest thinking on digital, innovation, social media, and open data in a blue light context. It brings together a range of people including paramedics, police, fire and rescue, mountain rescue, crisis management/emergency planners, hospitals and ambulance trusts, community and voluntary sector, government crisis response, mental health professionals, council staff and councillors, universities and researchers and software developers.

There's no pre-defined agenda: on the first day attendees suggest topics they'd like to discuss, and sessions are arranged accordingly. The second day brings together people with ideas, service experts, and developers who work together to turn those ideas into something more tangible. This can often be 'apps' which run on mobile phones or browsers.

¹⁰ 'How AI, Twitter and digital volunteers are transforming humanitarian disaster response' Wired Technology, September 2013. www.wired.co.uk/news/archive/2013-09/30/digital-humanitarianism

¹¹ 'Twitter has been important for emergency management in the UK local government', LSE, December 2012. blogs.lse.ac.uk/politicsandpolicy/twitter-has-been-important-for-emergency-management-in-the-uk-local-government-especially-during-the-2011-riots/

¹² 'Content Discovery – Distinguishing Signal from the Noise', Appinions, September 2014. blog.appinions.com/2014/09/30/content-discovery-distinguishing-signal-from-the-noise/

¹³ See bluelightcamp.org.uk/about-bluelightcamp/ for more information.

Government is rightly investing in developing Big data research and application. For instance, it is hoped that the London-based Alan Turing Institute research centre will become “a world leader in the analysis and application of Big data.”¹⁴ Government is also promoting the area around King’s Cross, Euston and Bloomsbury as London’s ‘Knowledge Quarter’.

So Gut or Gigabyte?

But without insight data is just data – and data on its own is not sufficient. It needs interpretation and early engagement with the public if policies are to be turned into actions. Making the most of data requires skills which are in short supply generally, but notably unseen in the public sector. It is critical that these are developed and, in the interim, augmented. The need for increased capabilities in data analytics is

Netflix – House of Cards – the first disruptor in the entertainment industry in a generation

A good example of data use for product development is Netflix¹⁵ whose approach to data analytics is reaping the company extremely rich rewards. When House of Cards,¹⁶ a remake of the BBC original series,¹⁷ came up for sale in 2011, Netflix was approached by the director David Fincher and the actor Kevin Spacey who were looking for someone to produce and distribute their remake. By simply analysing their data they determined in advance that House of Cards was likely to be a hit. Why? Because the subscribers who watched the original series also downloaded movies directed by David Fincher and ones that starred Kevin Spacey. The series has already recouped their \$100 million investment. Netflix is also using their data to cut marketing spend. They simply use their algorithms to determine who might be interested in Kevin Spacey, or political drama, and then recommend the series up-front to that subscriber.

equally pressing in the private sector according to the recent report from PwC Gut or Gigabyte?¹⁸

This report explores the changing nature of organisational decision making and the use of data by companies across the globe. It shows that senior business leaders in the UK are still using their intuition and experience, as well as the advice and

experience of others in their companies, in preference to data and analytics. When asked which inputs they placed most reliance on for their last major decision, data and analytics (internal or external) ranked second (29%) behind their own intuition or experience (30%). The report is based on a survey of over 1,100 senior executives worldwide.

¹⁴ City Financer to chair “Big data” research centre’, The Financial Times, June 2015. www.ft.com/cms/s/0/d5687818-08fb-11e5-b643-00144feabdc0.html#axzz3ojcFYadu

¹⁵ See www.netflix.com/gb/ for more information.

¹⁶ ‘David Fincher exclusive’, Empire online, March, 2013. www.empireonline.com/interviews/interview.asp?IID=1636

¹⁷ See www.bbc.co.uk/programmes/articles/1F1TT8ng10xQn3fTrdgy2RM/house-of-cards-trilogy for more information.

¹⁸ ‘Gut & gigabytes’, PwC Report, 2014. www.pwc.com/mx/es/servicios-tecnologias-de-la-informacion/archivo/2014-10-big-decisions.pdf

Getting ready

So it's clear – data is a huge disrupter to existing business models but also offers great potential cost savings for the public sector as attested to by the work of London based SME Mastodon C.¹⁹

In collaboration with Open Health UK²⁰ and Dr Ben Goldacre²¹ in just eight weeks, working with publicly available NHS prescriptions data, the team looked at the prescribing patterns in GP practices and Clinical Commissioning Groups (CCGs). Focusing on a class of drugs called statins, which are used to prevent cardiovascular problems, they found that an average £27m a month of potentially unnecessary expenditure on the two proprietary statins took place in 2012 in the NHS in England. The researchers estimate that, had every doctor prescribed lower cost statins, the drugs bill would have been more than £200m lower²².

Be aware of risks while embracing opportunities

Clearly, digital offers great opportunities to generate a wealth of new data but it is also important to put in place the relevant safeguards both for privacy and also to protect against cyber-attack.

The debate around privacy highlights an issue of public trust in government (as well as linked private sector organisations) to hold and manage data securely. This can be seen clearly in the health sector, where there is much debate about the use of personal data as part of predictive analytics to improve early detection of medical issues and facilitate early intervention.

Regulations also mean that data sharing agreements are needed between institutions which requires improved collaboration between them and also better engagement with the public.

Sustainable data systems are needed to ensure rich data resources, requiring leadership, trust, collaborative partnerships, and communication with the public on how their data is being used. The 'value proposition' for the public in sharing data has not yet been clearly set out (compared to, say, donating blood).

In addition, there are increasingly high profile cyber risks. Indeed, security breaches are on the rise. Survey respondents in PwC's 2016 study of the 'Global State of Information Security'²³ reported that the number of detected incidents increased by 38% in 2015 compared to 2014. Preventing this increase comes at great cost: with respondents boosting their information security budgets by 24% in 2015.

Cyber risks will never be completely eliminated. Organisations must remain vigilant and agile in the face of a continually evolving threat landscape. However, awareness and concern about security incidents and threats has become top of mind in the boardroom as well as among consumers. As incidents proliferate, governments are becoming more proactive in helping organisations fight cyber-crime. The US Federal Bureau of Investigation (FBI), for example, notified 3,000 companies – including banks, retailers, and defence contractors – that they had been victims of cybersecurity breaches in 2013.²⁴

¹⁹ See www.mastodonc.com for more information.

²⁰ See <http://openhealthcare.org.uk> for more information.

²¹ See www.badscience.net/about-dr-ben-goldacre/ for more information and contact details.

²² 'Beggars Thy Neighbour', the Economist, December 2012. www.economist.com/news/britain/21567980-how-scrutiny-freely-available-data-might-save-nhs-money-beggars-thy-neighbour

²³ 'The Global State of Information Security Survey 2016', 2015, PwC. www.pwc.com/gx/en/issues/cyber-security/information-security-survey.html

²⁴ 'The FBI says you've been breached by a nation-state. Now what?', PwC, April 2014. usblogs.pwc.com/emerging-technology/the-fbi-says-youve-been-breached-by-a-nation-state-now-what/



Case Study – PayPal cyber attack

Even savvy digital business like PayPal are not immune from cyber attack.²⁵ As reported by The Guardian newspaper, four activists from the hackers collective Anonymous caused multimillion-pound losses to a number of firms in revenge for the backlash against WikiLeaks.

Using the name Operation Payback, the four flooded websites belonging to companies with messages and requests in order to bring them down. People who tried to visit the sites were greeted with the message: “You’ve tried to bite the Anonymous hand. You angered the hive and now you are being stung.” The self-styled ‘hactivists’ caused losses worth more than £3.5m at PayPal.

²⁵ ‘Anonymous cyber-attacks cost PayPal £3.5m, court told’, The Guardian, November 2012. www.theguardian.com/technology/2012/nov/22/anonymous-cyber-attacks-paypal-court

Conclusions

Making the most of Big data

So the agenda for public sector leaders looking to create more data-savvy organisations is challenging. The clear areas for action are:

Building the skills base

Public bodies need to develop their data collection, management and analytics capacity and capability in order to produce the quality insight and intelligence required to underpin their strategies and plans.

Integrating data

Master data management, standards, policies and clarity on who is gathering what data for what purpose is needed. Big (and expensive) systems are not required to achieve these goals. This is about collecting, using and sharing information better. For example, most UK councils²⁶ do not gather data by unique customer IDs systematically across their places and cannot easily share this data in an integrated way. This also means they are often not able to understand customer preferences or perform rigorous evaluation of the effectiveness of current interventions or options and the return on investment. Citizen data gathering, trend analysis and the use of digital enables the development of these approaches.

²⁶ 'Redefining local government', PwC Government & Public Sector Report, 2013. www.pwc.co.uk/industries/government-public-sector/insights/redefining-local-government.html

²⁷ 'PwC's Global Data & Analytics Survey 2014: Big Decisions', PwC Big Decisions, 2014. www.pwc.com/gx/en/issues/data-and-analytics/big-decisions-survey.html

Opening up good data

Research into the use of open data and data analytics²⁷ has highlighted that the volume, veracity and speed of data all need to be improved. Overall, the quality, accuracy or completeness of the underlying data within organisations is often the biggest hurdle to making good decisions. There are also often limitations on the ability to share data for different purposes: frequently data provided by an individual or business to one public agency is done so under terms and conditions which mean that it cannot be automatically shared with another agency without prior consent. This needs to be addressed to realise the potential of Big data.

Balancing rights

There is therefore an important balance to be found between the rights of individuals to privacy and confidentiality and the benefits from sharing information. This requires better selling of the value proposition to the public, building public trust and reducing cynicism as to how their data will be used and alongside confidence in data security.

There is great potential for Big data to improve outcomes for the public but it requires investment, innovation and imagination to make this happen. And businesses – both public and private – need to give at least as much attention to persuading their customers that what is being done really is in their interests as to the potential opportunities and benefits of getting involved.



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