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Deloitte Analytics – Insight on tap
Improving public services through data analytics

Introduction

The UK's knowledge economy has been the largest source of new jobs and exports over the last 30 years.[1] Even manufacturing or aerospace firms that operate outside this sector now rely fundamentally on data to run their businesses. Across the economy, firms are investing in technology and process improvement to extract maximum value from their data. The most forward-thinking recognise the influence data can have on the future as well as the past. This transition from hindsight to foresight is helping firms to plan future operations, take out cost and improve specific areas such as customer service or supply chains.

By contrast, public bodies have been slower to recognise the value of the data they hold. But as we enter a period of fiscal retrenchment, fast-moving technological innovation and a renewed commitment to government transparency may compel managers to rethink the issue. There is now genuine opportunity for government to solve the riddle of better, cheaper services through smarter use of data. This is data analytics, which does not always involve significant capital outlay to drive improvement.

The scale and range of government data is overwhelming. HM Revenue and Customs interacts with over 40 million customers, about 12 million more than the big four high street banks combined.[2] Departments, agencies and local authorities procure over £243 billion worth of goods and services.[3] About six million people work in the public sector, each of whom has a record of performance, sickness absence and years of service.[4] Every year, about 697,000 students make 2.7m applications to higher and further education institutions.[5]

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Data is also held in large volumes across local government, where typically it may be more fragmented and less easy to analyse, but no less valuable.

The importance of public data was recognised by the previous administration in a 2009 paper *"Smarter Government: Putting the Frontline First"*. This included a commitment to increase transparency and social innovation through publication of new datasets. This work has been continued by the Coalition Government with the creation of the www.data.gov.uk, followed by the announcement in January 2011 of a future Public Data Corporation to revolutionise access and bring public data into one place.

Pockets of excellence already exist in the public domain. Organisations such as the Met Office, Hydrographic Office and Ordnance Survey have demonstrated how public data can be manipulated and reused by third parties effectively.[6] Public bodies such as the Environment Agency have also taken steps to embrace data analytics. In the West Midlands, the NHS has used analyst modeling techniques to project their future workforce needs, and configurations to respond to significant activity, financial and quality pressures. Overall however, there are few occasions where new data has led to material improvements in public services.

Deloitte's view is that, together with publishing greater volumes to improve transparency and greater third-party reuse, public bodies should also act to improve the way they use data internally and across a range of business areas. Like private-sector organisations, data analytics can drive long-term and strategic improvements in corporate efficiency, enabling incremental improvements through evidence-based decision-making. As markets open up and consumer data proliferates, there may also be opportunity for government to apply insights obtained from private-sector partners to shape policy or operational decision-making.

Data analytics is also highly relevant to government's immediate future. Applied correctly, it represents a major weapon in the fight to bring down costs in public bodies. This does not necessarily mean capital technology investment, but a cultural commitment to use data to guide decision-making. In working to reduce operational spending, there is a real danger that public bodies may offload the wrong skills, divest the wrong assets, or commission the wrong types of services. Experience shows that in the past, these mistakes were made because of flawed or incomplete data, or a failure to use data effectively. Far from being an esoteric investment, data analytics is actually central to the number one priority public bodies face today.

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Data analysis opportunities in the public sector

The full range of opportunity can be broken down into four categories set out in Figure 1. Some of these areas involve improved data *analysis*, not data analytics *per se*. Data analysis is a process. It involves the use of tools, experience and knowledge to investigate situations, causes and impacts.[7] Data analytics by contrast is a specific tool or set of capabilities that may be used to support analysis by extracting actionable insights from data. Often, analytics tools will be predictive. They may involve scenario analysis, modeling or projections and variance analysis.[8]

Figure 1. Categories of government data

Government departments, agencies and local authorities			
Corporate functions	**Operations**	**Policy development**	**Scrutiny and reuse**
Corporate performance Responsiveness to changing requirements and capabilities.	**Business process efficiency** Data on key components of operational service delivery: costs, performance, value.	**Evidence-based policymaking** Market data, customer data, behavioural trends, international benchmarking.	**Parliamentary and council scrutiny** Asking the right questions, high quality performance data, driving public sector responsiveness.
Workforce analytics Absenteeism, recruitment, performance, training and development, staff unit cost and individual capabilities.	**Customers** Behaviour, requirements, supply and demand across different product groups.	**Regulatory impact** Costs and administrative burdens, economic competitiveness	**Transparency** Improved public awareness of policy effectiveness. More targeted and responsive public spending.
Financial performance Asset management and resource allocations, real time balance sheet and resource account data.	**Technology** Performance, cost, utility, interoperability and technical problems.	**Service demand** Supply and demand projections, costs, aggregation across silos for a whole system understanding (e.g. social care).	**Reuse by third parties** Key data to foster innovation and new ways to present and apply data.
Asset analytics Equipment, land and buildings: value, depreciation, location, utilisation rates.	**Fraud, error & waste** Frequency, cost, most problematic areas, benchmarking.	**Market failure** Understanding threats and risks, tracking outcomes.	**New social media channels** Organise so data can be readily accessed and manipulated through new channels.
Procurement analytics Risk based maintenance and regulation.	**Systems performance** Data on end to end systems benchmarking and across the customer channel mix.	**Unintended consequences** Forecasting impact and secondary consequences as third parties respond.	**Commercial value** Open up new revenue streams by aggregating and licensing government data.

Source: Deloitte Research, 2011

At present across public bodies, aggregation and exploitation rates vary considerably. For example, understanding of public sector absenteeism rates are currently based on a mix of intermittent official government figures, annual reporting by the CBI and anecdotal research by think tanks. Although many public bodies may collect data on absenteeism, the overall picture is neither categorical at national level, nor sufficiently granular within individual organisations to be of use. But critically, where data is collected on absenteeism, it is rarely used to help identify the underlying causes of the problem or develop policy solutions. While conventional data analysis may illustrate numbers and rates of absenteeism, it would not illuminate hidden trends and causal links in this way.

Workforce planning & modelling

The NHS' workforce, as well as being one of the largest in the country, has a fundamental impact on the quality of care provided in the UK. Given the significant lead time in training professionals, the NHS needs to predict demand for professional groups against a backdrop of rapidly-changing methods of healthcare provision. As the NHS goes through significant change, traditional assumptions based on previous years are becoming less reliable. Leading NHS organisations are increasingly using advanced planning, modelling and other analyst techniques to help them project and understand their future workforce needs. Analytic and statistical techniques are also being used to understand and respond to the impact of changing financial, activity and quality pressures on the workforce, supporting moves towards more integrated planning processes.

In some instances, public bodies do collect transactional data at scale. But the example of education analytics illustrates the difference between basic transactional reporting and insight-driven interventions. In some institutions Deloitte works with, subject matter expertise is applied to data to enable high quality assessments in, for example, future student churn rates, probable student attainment levels, varying demand for different modules and income trends from fees. By creating the insights needed to respond dynamically, these institutions are able to improve the quality of their decision-making and strategic planning. They can also prepare more effectively for challenges such as budget reductions.

Data analytics also extends to corporate functions, as shown in Figure 1. Deloitte works with a number of public bodies that are investing in enterprise systems and data analytics techniques to enable strategic planning for their workforces. This work brings together categories of data about individuals to predict trends around retention, career intentions, prospects and recruitment. It can also be utilised to identify potential future leaders.

From working on some of government's largest and most complex programmes, Deloitte believes data analytics should form an essential part of departmental and local authority responses to the challenging spending climate and the need to squeeze more value out of existing assets and capabilities.

Set out below are three basic challenges – specific to public sector organisations – that need to be confronted before clear, analytics-driven improvements can be realised.

Business challenge 1: Collect the right data, drive up accuracy

For each public-sector organisation, and for government as a whole, there is significant variation in the volume of data that is collected and assessed. For example, some local authorities collect and manage data on their property portfolios – collectively worth over £250 billion or two thirds of total public-sector property by value.[9] But as the Audit Commission's 2009 *Room for Improvement* report noted: "For the purposes of making strategic asset management decisions... only the strongest councils collect more sophisticated information."[10] It also went on to say that a lack of time, capacity or resources prevent around 66 per cent of councils from collecting and assessing the data they need for strategic asset management of their property portfolios.[11]

Central government faces similar challenges. For example, official figures show that as many as 3.5 million personnel records, out of a total of 47 million may be inaccurate in some way.[12] For data in the public domain, the Treasury's own view of the release of data through the COINS database acknowledges that it is "complex" and "require[s] technical expertise to process".[13]

All public-sector organisations could work to establish a baseline standard of clean, verified, consistent and useful data that can be collected relatively cheaply and transferred efficiently around the business and elsewhere. This work would be made more challenging by legacy systems that might not be simple to dismantle or integrate with new systems.

Such a transformation in public data would be extraordinarily difficult to execute, particularly as investment would need to be put forward without certainty on how public services might be improved as a result. There is a big risk that significant resource might be invested to create a baseline standard of data consistency, only for the actual benefits to be negligible.

Policy development
The credit reference agency Experian has been working with local authorities to create segmentation and profiling techniques to allow councils to identify, benchmark and target demand for public services, often before it arises.

This work has allowed councils to focus marketing and communications efforts, allocate fewer resources more effectively, optimise service locations and identify opportunities for service bundling. This insight created by Experian will allow councils to target reduced resource more effectively in future.

Business challenge 2: Evaluate what is possible today and tomorrow

Action to embrace data analytics must be carried out within the context of sharply reduced budgets that may limit technology investment programmes and capability renewal across government. While data analytics systems may not be possible at zero capital cost, emphasis could be placed on 'sweating' existing data sets and collection systems harder and encouraging smarter thinking across each organisation. Data analytics is a matter of establishing the right culture as much as it is about technology.

Operations

Two UK police forces are currently trialling data analysis technology that combines geographic data, census data, land use information, crime incident reports, and other information to create accurate maps of crime trends in neighbourhoods.

The CRUSH system (Criminal Reduction Utilising Statistical History) evaluates patterns of past and present incidents, and combines it with a range of data including crime reports, intelligence briefings, and offender behaviour profiles.

More widely, planning for data analytics could be divided into two spheres: the 'present possible' and the 'potential possible'. The 'present possible' could involve pilots to trial new methods of manipulating data, board level consideration of near-term technology and competency investment, and work to improve spans of control over data within existing budgets and programmes.

The longer-term aspect, the 'potential possible' would seek to develop business improvement by data showing dismantling cultural resistance to data sharing and making specific investments to expose data held deep within transactional systems. It would also involve a fundamental review of supply chains to understand where latent value lies in organisational data.

In short, public-sector data analytics requires both a short- and a long-term vision. The 'potential possible' requires a ten- year plan, a commitment to making significant technology and non-technology investments, and management of a cultural shift that focuses on extracting value from data at every level.

Business challenge 3: Get ambitious about joined up government

To maximise fully the potential of data analytics across the public sector, managers will have to revisit the familiar problem of sharing data in a timely way across government organisations. The imperatives for joined up government are based around efficiency (removing duplication and waste) and service quality (offering a customer-centric model of public service delivery). Data analytics is integral to both these objectives, but current structures and corporate cultures within government place limits on how much data analytics can do. In this way, improved data analytics and joined up government are interdependent: Whole-system transformation in the former depends on improvements in the latter.

Further, following the 2010 Spending Review government is considering wider use of outsourcing more to the private and third sector. In this changing landscape, the lines between public and private domains are blurring. It will become increasingly important to establish data ownership and protocols for data sharing, and ensure that data is collected and exploited in an integrated way. One of the key drivers of previous contract failure has been information asymmetry, where a contractor has utilised data it holds to exploit contract weaknesses. Better data analytics in government represents part of the solution to this, but the channels and processes for presenting data in a timely way need to be established across an increasingly fragmented group of partners.

In the public domain, government is in the process of making more data available for citizens to drive transparency and access. As the rate of public and private data combinations increases exponentially, it will also be important for government to bring together public and private data to help improve policymaking. Through their own customer channels, large consumer-facing corporations could provide significant insights into citizen behaviour.

If partners in the private and voluntary sectors already have good customer insights embedded into their business models, there may be no need to create duplicates in government if security, privacy and interoperability challenges can be solved.

There are obvious data protection and security issues around pooling data in this way, and sharing is not always incentivised for corporates. But through mechanisms such as 'opt-in' clauses for customers there is potential for government to utilise excellence in private-sector customer relationship management to improve its own services and policies. If partners in the private and voluntary sectors already have good customer insights embedded into their business models, there may be no need to create duplicates in government if security, privacy and interoperability challenges can be solved.

Scrutiny and reuse

The Government's www.data.gov.uk website has led to a number of new applications, often designed by citizens or businesses to generate value from public information by analysing or presenting it in different ways.

For example, the Roadworks database allows users to search and view all scheduled UK road works by county. Updated each weekday, it contains records of lane closures for the next two weeks. The information represents unedited data from the Highways Agency's database of Scheduled Roadworks and is offered as an aid to journey planning.

Another example is 'MRSA & C.Diff', an application that shows users the latest figures for superbug infection numbers at all English National Health Service hospitals. Patients are able to see how their local hospital is performing and rank it against other hospitals in the area.

Recommendations

By confronting the three business challenges outlined above, public bodies have an opportunity to create the right conditions for data analytics to make a positive impact. But there are also some practical actions public-sector managers can take to build data analytics in their organisation. Public bodies need to:

Understand the purposes of data analytics

The starting point for investment in analytics tools and techniques is to establish clear links between the purposes of analytics projects and business drivers. For example, if a public body wants to prioritise cost reduction, predictive analytics should be used to chart future cost profile across business activities, and provide managers with the insight to make meaningful decisions. In addition, public bodies cannot develop a data analytics strategy until they know what they have in terms of data. Managers need to review what is already available in terms of verified and consistent data before taking forward investment.

Understand what 'good' looks like

Data analytics, particularly predictive analytics, consists principally of emerging mathematical and technological techniques. Outside specific sectors such as actuarial or insurance services, there are few domestic examples of best practice or long-established systems that are readily transferrable to the UK public sector. By contrast international experiences, particularly in the United States, Canada and Australia, demonstrate how analytics can be used in a public management context to drive real improvement.

Start simple

Based on Deloitte's work with public bodies, it is clear that investment in data analytics should be incremental, with trials to test what works, and analysis to understand where 'quick wins' that deliver measurable benefits can be implemented. The public sector is enormously complex and data-rich. In creating analytical tools to inform decision-making, too many signals can be as problematic as too few. Running manageable pilots in high impact areas to test hypotheses will be a key part of this work.

Think about customers

A focus on customers, whether internal consumers of data or actual service recipients, is key to ensuring the right data is processed and managed in ways that enable fact based decision-making and free up staff to focus on functions that require human judgement. Customer-centric analytics systems present the right data at the right time and in a manageable way. Any data that managers or citizens don't require in decision-making is superfluous. As government markets open up and consumer data proliferates, there will be significant opportunities to use insights obtained from private-sector partners to assist government operations.

Develop a new culture

Across public bodies, cultural change will be essential to embed effective data analytics. Data exploitation may be enabled by technology, but it is fundamentally about staff at all levels recognising how data can empower their work. Public bodies should establish data analytics as a core competency within their organisation, discuss related projects regularly at board level and create ancillary roles such as knowledge management functions to get the best from new systems.

Conclusion

The UK public sector faces multidimensional challenges, from the need to improve basic services to more tactical challenges such as improving customer insights, managing reputational risk, confronting fraud and error, or making long-term strategic workforce assessments. Data analytics – particularly predictive analytics that applies data mining or mathematical techniques to provide actionable intelligence – is the key to business improvement across the sector.

It is essential that work to extract cost through headcount reduction or asset divestment should be driven by data. Simply removing management tiers, specific capabilities and assets without any evidence risks future services. Data analytics will be central to navigate reduced budgets effectively.

Data analytics must become a core competency within public bodies as well as in the public domain. While transparency is important, investing in the right data analysis software, people and processes will enable public bodies to integrate diverse data and increase the effectiveness of their services. They will also be able to combat fraud by combining and analysing social and financial data provided from a range of sources.

Data analytics must be treated as more than just a helpful tool. It should extend throughout the organisation and be driven by public-sector leaders. The culture of localised data ownership, held over from the days when governments were reluctant to share data, even within their own walls, needs to be dismantled. Developing a new culture that places data analytics at its core will be essential.

While transparency is important, investing in the right data analysis software, people and processes, will enable public bodies to integrate diverse data and increase the effectiveness of their services.

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Notes

1   http://www.egovmonitor.com/node/27160/print

2   http://www.hmrc.gov.uk/about/corporate-responsibility/customers.htm

3   PESA 2010, HM Treasury

4   Labour Market Survey, 2010, Office of National Statistics

5   http://www.ucas.com/about_us/stat_services/stats_online/annual_datasets_to_download/

6   http://www.ordnancesurvey.co.uk/oswebsite/products/os-opendata.html, http://www.ukho.gov.uk/ProductsandServices/Pages/Home.aspx,7 http://www.metoffice.gov.uk/services

7   http://www.mydials.com/newsroom/dialedin/2010/03/03/the-difference-between-analysis-and-analytics/

8   Ibid.

9   http://www.propertyweek.com/councils-are-%E2%80%98failing-to-realise-value%E2%80%99-of-%C2%A3250bn-of-property/3143189.article

10 http://www.audit-commission.gov.uk/SiteCollectionDocuments/AuditCommissionReports/NationalStudies/roomforimprovement17jun2009REP.pdf

11 Ibid.

12 http://www.telegraph.co.uk/news/newstopics/politics/4060686/Tenth-of-personal-data-held-by-Government-is-inaccurate.html

13 http://www.publictechnology.net/sector/central-gov/govt-drops-first-set-coins