OLD CITIES, NEW BIG DATA

Cadillac

WRITTEN BY:

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Big datasets have been used by authorities and public bodies for centuries, whether in the form of the national census, maps, surveys or public records. What is new is the sheer volume, speed, diversity, scope and resolution afforded by 'big data', a term that describes the wealth of information now available thanks to a combination of ubiquitous computing and sophisticated data analytics.
To optimists, this avalanche of information, if harnessed, provides valuable insights for everyone from company executives to consumers and from governments to citizens.

Urban planning and city services have always been a fundamental part of this story, with integrated data systems bringing a 'second electrification' to the world's metropolises . As case studies of big data's urban applications emerge around the world, what are we learning about the kinds of contexts which are proving most receptive to it? More specifically, how relevant is the age of a city in determining its interest in, and ability to use, big data? This briefing explores how both old and new cities have distinct advantages and disadvantages in their ability to use big data effectively, assessing how they deploy the tools, the lessons they can learn from each other, and their common challenges.

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NEW SOLUTIONS TO OLD PROBLEMS

In established cities, big data is still far from the norm. Some urban authorities have grasped the technologies eagerly. Others are tinkering with pilots. Many are watching on to see how the experiments go.

Among the adopters, big data tools are frequently applied to specific and known challenges, helping users sift and organise existing data so it becomes easier to read and interpret. In New York City, for example, authorities are collating data from 19 agencies – including property tax delinquencies, ambulance call-outs and even the condition of external brickwork - to highlight fire risks. Insights have improved the predictive accuracy of building inspectors to 70%, from 13% before the project. "The city had previously been taking the view that all [its] one million buildings are the same," recalls programme leader Michael Flowers, urban science fellow at the Centre for Urban Science and Progress (CUSP) at New York University.

"Established cities typically use big data tools to address specific and known challenges"

In a similar way, big data has brought improved resolution to tax services. With ten million tax returns annually, the New York City authorities receive around 4 million tax 'exceptions' requests. But with each personal income tax submission containing up to 14,000 data elements, that provides an enormous quantity of information to sift through to calculate tax credit eligibility. Big data tools are pulling together information about taxpayers, leveraged across departments, to discover whether they have wrongly claimed tax credits, for instance. The process has prevented $1 billion of refunds being erroneously issued.

Such targeted big data projects are attractive because they "have a more direct impact, they're easier to get your arms around, and they're organisationally easier [than broader projects]," says Steven Koonin, director of CUSP.

Big data is also helping build an interactive communications ecosystem between users and providers of public services in these locales. "You can make visible the quality and quantity of municipal services that the citizens are getting at a very granular level [through big data]," says Mr Koonin. "How's my police coverage, or my bus routing, compared to that of the folks across town?"

Dublin's integration of GPS data and timetabling has generated a new city-wide view of the public transport system, with bus arrivals, transit times and route congestion portrayed in a digital map of the city allowing services to be tweaked and problems addressed swiftly. In Chicago, the most visited section of the city's website is a 'plough-tracker' that allows residents to find the location of snow ploughs across the city in times of need, while in Boston, a smartphone app shows authorities the state of the streets. As motorists drive through the city, the app submits data about the smoothness of their ride.

While such applications are granular, there is evidence of a joined-up system pooling information together to strengthen service coordination. The stand-out example is Rio de Janeiro in Brazil, one of the world's oldest cities and one of the largest in the Americas. The city formed a body in 2010 to coordinate emergency response by collating data from 30 agencies to improve responses to emergency situations.

> "Targeted projects 'are easier to get your arms around' than broader projects"

Information on weather patterns, traffic, municipal services and public transport are all collated. Police at the scene of an accident can now know when ambulances have been dispatched, and how many. GPS-equipped rubbish collection vehicles can be diverted to support with a range of emergencies, such as the landslides Rio suffered in 2010. Overall, emergency response times have improved by 30% in the city. "Even if you step away from the technology, the achievement of bringing together 30 government agencies with a single purpose - i.e. coordinated management of some of these challenges in the city - is terrific," says Michael Dixon, general manager of Global Smarter Cities at IBM.

Experiences from Rio to New York show that leadership, from the top, remains the critical variable in driving the adoption of big data across agencies, and breaking down silos. "Whichever cities that are leading...you can always find the individual who is the very strong leader, that has the vision and commitment for delivering results and is accountable for getting them," says Mr Dixon.

"The critical variable in driving adoption: leadership from the top"

THE NEWCOMERS

New urban projects—including full cities, business and industrial parks and new residential districts—are being announced in a handful of locations around the world. Among them are Masdar City in the United Arab Emirates, Songdo International Business District in South Korea and Palava in India. Like big data adopters in the established cities there is a recognition of the potential of big data to solve urban challenges. Unlike established cities, new cities are able to build in urban analytics from the start.

Beginning with a 'clean sheet' gives them an advantage, says Mr Dixon. According to him, new cities are "typically smaller and more ambitious, and they have more opportunity to have a direct line of sight on some of the issues".

Maintenance systems can be installed from the beginning of an asset's life cycle, for instance. In Songdo, sensors are in place as part of the infrastructure build, to monitor asset condition and help schedule maintenance work. Similarly, in Masdar City, sensors are installed with infrastructure to monitor water and waste around the city, informing decisions about flow, usage and maintenance. Both enable a more comprehensive upkeep strategy than might be possible in cities without analytics built in.

"New cities are relatively free from bureaucratic and cultural inertia"

Such predictive models are one of the key contributions of big data to urban asset management over the life cycle. "This allows us to address issues around assets before there is failure, or, through better maintenance, to ensure a much longer life," says Shaishav Dharia, development director at Lodha Group, the real estate developer behind Palava in India.

Cost reductions are also reaped from the relatively lower cost of building in analytics from the beginning rather than retrofitting, he adds. Mr Koonin of CUSP sounds a similar note: "I can't see [anyone] putting in infrastructure now that isn't instrumented in some way, given the modern technology available and the low cost of sensors."

A second advantage enjoyed by new cities is their relative freedom from bureaucratic and cultural inertia. IT infrastructure, for instance, may have developed over decades in established cities, spread across agencies using different programming approaches. "The development of conflicting communications protocols for emergency services is really common and something we are dealing with in lots of places," says Mr Dixon.

New cities, he adds, may not have to deal with "half a dozen agencies all embedded in conflicting communications protocols". New cities may also be free of organisational, historical and cultural imperatives that make people resistant to change. "I don't think that the obstacles or the challenges in this area are technical. The technology exists [and] can be applied. The issues that determine success are like many other challenging or ambitious things: they are cultural, they are organisational, they are political" argues Mr Dixon.

The downside of new cities being 'free from history' is that they also lack experiences to draw on, which can mean they build big data into an urban scenario which is often uninhabited or under-occupied. This entails all kinds of predictions having to be made about what the city's problems will be once it is active and growing; a monumentally difficult task. "In a city that is designed, as opposed to a city that grows organically, there are all these top-down decisions that are made that fail to fully capture the huge complexity of humans interacting with each other and with their environment," according to Mr Flowers of CUSP.

Mr Dharia recognises this challenge but is not daunted, arguing that 80% of smart-city initiatives focus on obvious and uncontroversial tools, along with more speculative bets. Even if the business case for big data is not entirely clear from the start, it will emerge in due course, Mr Dharia says. He concedes, however, that planners of new cities must make calculated bets about investing in data analytics for the 20% of initiatives related to less obvious services.

POLITICS IN COMMAND

With old and new cities having their unique advantages and disadvantages in terms of big data adoption, one question remains common to both: does collecting and analysing information intrude on citizens' privacy, and what kinds of new risks do the technologies bring?

Big data has already faced privacy controversies. In August 2013, the City of London halted one company's plans to use recycling bins to track the smartphones of passers by, to obtain input to use for personalised advertising. Similar problems were evidenced in the US where customers in a retail store were angered on discovering that sensors were monitoring their movements around the store . All of which shows the need for clear opt-in and opt-out features for any big data systems, especially those in public spaces.

Steven Koonin acknowledges the privacy question, and believes it can be managed given that it is not individual data that is necessarily being sought. "You can preserve privacy but at the same time get the information you need out of the data. For many of these [big data applications], you don't care about individuals; you care about group behaviour".

His views chime with those of the UK company in the London case mentioned above, which said that it was seeking data on issues like numbers of people passing by, and that the information was anonymised.

But big data could also be used for privacy-breaching criminal ends, such as helping thieves find targets based on information such as disposable income and the locations of broken streetlights . More seriously, cyber-terrorism is an emerging worry as security companies and hackers find vulnerabilities in a range of smart city technologies, from road sensors to internet-enabled surveillance cameras.

> "New cities usually 'have more opportunity for a direct line of sight' on big data issues"

For these reasons, and others, big data sceptics want to promote debate about the tools' application in cities, whether old or new, and to involve a range of voices in this debate - not just urban authorities and vendors. Like any other technology that is brought to bear on public life, the deployment of analytics founded in big data "needs to be subject to processes of democratic accountability," says Adam Greenfield, senior urban fellow at the London School of Economics. "And I don't see that happening in very many places at the moment."

ABOUT THIS REPORT:

Old Cities, New Big Data was written by the Economist Intelligence Unit. It examines how both established and new cities are responding to the opportunities of 'big data', and their relative strengths and weaknesses in doing so. This report was based on five interview with experts in the fields of big data and urban planning, combined with desk research. The Economist Intelligence Unit would like to thank the following individuals (listed alphabetically by organisation name) for sharing their insights and expertise during the research for this paper:

· Michael Flowers, urban science fellow, Centre for Urban Science and Progress, US

· Steven Koonin, director, Centre for Urban Science and Progress, US

· Michael J Dixon, general manager, Global Smarter Cities, IBM, Australia

· Shaishav Dharia, development director, Lodha Group, India

· Adam Greenfield, senior urban fellow, LSE Cities, London School of Economics, UK