Data Analytics in the Property Sector

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Data: the catalyst for change in management of NSW Government's $134bn property portfolio

Data analytics is transforming how property is created, built and maintained around the world. It enables the property industry and cities to better understand customers, tenants and users, to better plan, design, build and maintain our cities.

In NSW, the Government's Data Analytics Centre (DAC), established in August 2015, coordinates data sources across Government in order to drive better evidence-based decision making and ultimately enhanced service delivery for the community.

Property NSW, the whole-of-government property agency, is collaborating with the DAC on options to bring cutting edge changes to the way NSW manages its $134 billion property portfolio.

Too often government data can sit in silos across respective agencies, with little thought given to collating and distilling the data in a way that will ultimately improve the way government services are delivered.

The potential value of open government data in Australia is estimated at tens of billions of dollars.[1]

In 2013, it was estimated that the transport and education sectors alone could see over $30 billion in increased economic value each year as a consequence of open data.

Global cities are using technology to collect data to plan and create buildings and public spaces that meet the needs of the community.

New York and London are two such cities leading the world in technology readiness.[2]

Privacy remains one of the biggest challenges in data collection, however, there is a tremendous opportunity to use data to deliver better services.

Research found that nearly 80 per cent of NSW residents surveyed support the NSW Government using its existing data to inform decisions on the development of services and infrastructure.[3]

In addition, 93 per cent of NSW residents surveyed believe it is important for the Government to improve its systems for collecting and analysing data in order to meet the demands of a growing population.[4]

Data analytics is transforming how property is created, built and maintained; Sydney can learn from other global cities in our collection, sharing and use of data to benefit our city.[5]

More broadly, the types and quantity of data now available from mobile phones, social media, sensor technology, credit card use, video and photographic material, and the growing number of devices in the "Internet of Things" (IOT), reveals previously obscured patterns in human and market behaviour.[6]

This data can be applied along the property cycle - from strategic planning to construction and asset management.

For example, big data is used in project planning to make-clearer and more informal decisions. Designers are also using near-time people-flow analysis to improve existing and new infrastructure and identify retail opportunities.

In construction, data analytics is used to improve safety and compliance. Data is also assisting asset management decisions by gaining smart building solution insights in order to reduce costs and impacts on the environment.

This report looks at how the property industry is using data to drive enhanced performance, and also outlines opportunities for governments to drive more efficient asset management.

Definition

Data analytics is the process of scrutinising data to gain insights. Recently, data analytics has moved from small scale and static data sets to Big Data Analytics which looks at massive volumes of varied information that is constantly changing at high speed.

Privacy Challenge

Privacy is one of the biggest challenges of data collection. Data is collected by a variety of different entities with different agendas. In the majority of cases, personal data is collected to understand the needs, preferences and motives of everyday choices.

However, other cases involve personal data being exploited without consent. Recent research conducted by MIT has found that *"just four fairly vague pieces of information – the dates and location of four purchases – are enough to identify 90 per cent of people in a data set recording three months of credit-card transactions by 1.1 million users."*[7]

Anonymising and cleaning data for use and sharing is imperative in an open data environment while still retaining enough granularity that the data is still useful.

1 https://data.wa.gov.au/__data/assets/pdf_file/0015/9150/fact-sheet-open-data-benefit.pdf
2 PwC, Cities of Opportunity 7 , 2016
3 Galaxy research based on survey of 1,000 NSW residents, September 2016.
4 IBID
5 News.com.au, The six key challenges for Sydney and Melbourne to be smart cities of the future, August 22, 201 6
6 Dr Alex Pentland, Big Data and Social Analytics Course, MIT
7 Hardesty, L. Privacy Challenges, Analysis: It's surprisingly easy to identify individuals from credit-card metadata

People patterns to drive city of the future

In the city of the future, information will be sent to your smart device suggesting services and recreational activities based on your geolocation, previous internet search history and recent activity profile. You may also be charged, on a user-pays basis, for utilities as well as optimise those utilities based on real-time user patterns. Your use patterns will go into a pool of data which can be used to design new places tailored to the population's needs and wants.

The data can also be used to assess how well developments deliver on their cost-benefit promises, for example, the use of space via a measure of foot traffic.

The city of the future will be able to respond to the sentiment of citizens and engage in meaningful interaction; enriching lifestyles and connecting people. The most advanced and coordinated cities are already heading in this direction. Civic analytics focus on customer-centric solutions that also deliver efficiencies rather than purely using data for cost-reduction or profitability measures. Future Cities Catapult, a UK Government-supported centre for the advancement of smart cities, believes inhabitants' wellbeing is the foundation to sustainable solutions.[8]

Examples of data analytics at work across the property lifecycle include:

Strategy: Insights from PwC's Geospatial Economic Model are being used by government to inform the strategic planning of new infrastructure and to target development to employment and population centres.[9]

Planning: The DAC is using information gathered from rental bonds data, electricity consumption and the number of bedrooms in land and property details, to understand the extent of overcrowding in the community. The aim is to establish frameworks to constructively deal with the problem. Housing affordability is a critical issue in NSW and the aim is to prevent the exploitation of vulnerable members of the community.

Overcrowding can lead to health and hygiene concerns, fire hazards and places stress on local infrastructure. The issue can be better managed by identifying key indicators for at-risk locations. The same approach can be used to identify underutilised property that could be brought on line to decrease the rental shortage and ease housing affordability concerns.

Technology moves very quickly and yet governments can't move that quickly…ultimately it can render governments irrelevant.[10]

Development: The private developers of the Hudson Yards project in Manhattan, New York, are working with New York University to install sensors that track the movement of people and monitor air quality, traffic and energy use.[11] In synthesising this data, real estate developers and urban planners can formulate a better understanding of what makes a successful place in terms of tenant health, interaction and utility efficiencies.

State of Place is a data analytics tool that uses image analysis to rate urban places for livability and propose interventions that can encourage economic uplift and revenue increases. The platform defines more than 160 factors that contribute

to the experience of a place and assists city governments and developers to apply that inventory to create walkable and livable cities.[12]

Engagement: The US city of Santa Monica has started integrating linguistic content analysis of social media data to provide a Wellbeing Index. The Index is used to "assess the sense of community as well as positive or negative sentiment".[13] The data is combined with traditional survey information and demographic measures to help the city work out ways to improve the wellbeing of its residents. Santa Monica officials are using the information to make changes in the city, including introducing measures to increase the use of outdoor space for target areas and create spaces for social engagement to decrease loneliness in young people.[14]

Case Study

UK Government – using open data to drive change[15]

The UK Government has embraced open data as a way of increasing transparency of government services and improving service delivery.

In 2009, IT cost the UK Government £19 billion, prompting a fundamental rethink around procurement, and a heightened focus on spending controls.

Liam Maxwell, National Technology Advisor to the UK Government, said the revised approach not only saw a focus on open data to drive transparency, it also committed to open standards and open markets to encourage competition and deliver better outcomes.

He pointed to a number of reforms which helped deliver change across government, including:

- *Reducing the number of security classifications from nine to three, ensuring greater sharing of data between and across governments.*
- *Enhanced capability across the public sector – attracting new talent and new ideas to the public sector.*
- *Changing procurement practices to attract a broader range of companies to sell to government. More than 350 technology vendors are now selling to the UK Government, 52 per cent of them small to medium enterprises.*
- *Moving away from legacy, custom systems and instead embracing reusable, shared platforms.*

Case Study

New York MODA

The Mayor's Office of Data Analytics (MODA) allows the City to "collaborate with City agencies to implement data-driven solutions to City service delivery".

Significant impacts have been made, including the development of Fire Department and Disaster response risk maps and a new business atlas providing entrepreneurs with information about where to best locate their business. MODA data is also used to study how economic improvement policies are affecting economic growth.

8   Austin, N, Why Australia needs to get up to speed in creating smart and connected cities, AFR, October 1 9 2015
9   PwC, Big City Analytics, 2015
10 Liam Maxwell, National Technology Advisor, UK Government, FST Gov Conference, May 2017
11 Hudson Yards, Engineered City
12 Goodyear, S., If You Want Walkable Development, You Must Show That It Pays, 201 2

13 J. Wiseman, 'Customer Driven Government', Data Smart City Solutions, Harvard, August 20 2015
14 The City of Santa Monica Well Being Project, Wellbeing Findings Data Briefing, 201 5
15 Liam Maxwell, National Technology Advisor, UK Government, FST Gov Conference, May 2017

Improved efficiency in asset management

Data analytics is having an even more profound impact in the area of asset management due to the measurable effects on efficiency. With the increased prevalence of IOT devices, building management systems now have a multitude of data points with which to assess the efficiency of a building.

There is a shift away from traditional building management systems - which operate in isolation - to a centralised command centre model which synthesises the vast amount of data available at any given time to provide the most effective solution.[16]

Again, the insight occurs in the cross-over of data from different sources. The applications focus on both the maintenance and design of property assets.

Design: Through its 'People Flow Analysis Project', multinational technology conglomerate, Hitachi, has revolutionised the way places are designed. This technology was first developed to analyse the movement of people throughout a commercial office building. Hitachi was able to optimise the floor layout in relation to core areas such as hallways and lift shafts, ultimately reducing pedestrian congestion and stimulating the flow of people through the structure.[17]

Global retail conglomerate, Westfield, has also adopted data analytics as a tool to integrate consumers' digital footprints (online purchases and social media activities) with cameras and sensors set up within retail centres to *"enhance the physical brick and mortar shopping experience"*[18]

Portfolio Management: Property NSW has developed an interactive dashboard for client agencies to more effectively manage their property portfolios. Property Portfolio Reporting is presented in a way that allows agencies to view key performance metrics for their Property NSW-managed portfolio, including upcoming lease expiries, options and market reviews.
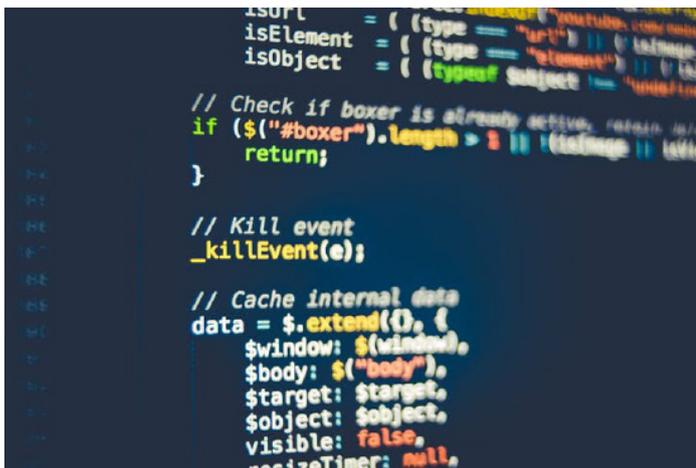
The data also allows agencies to compare their performance against other NSW Government clusters – encouraging greater efficiency across their portfolios.[19]

Operational Efficiency: Microsoft collects 500 million bits of data every 24 hours at its headquarter buildings to reduce the costs of operating the campus. The information is run through algorithms that factor in the costs of fixing or not fixing a fault. The algorithm also factors in the impact the fault has on people using the building to gauge its level of importance.[20]

Visualisation: Lendlease uses Ineni Realtime virtual reality to create a building management system at Barangaroo based on data, including: lighting, lifts and temperature control systems. The virtual reality environment provides an accessible dashboard for visibility over diverse data sets. Locating maintenance items in virtual space, supplemented with a camera live-feed, provides an assessment of conditions before sending in support teams or technicians. The building management system also has a smartphone application for easy access.[21]

Case Study

Asset Scale - Stockland[22]

Why?

In 2015, Stockland Property Group announced the implementation of EP&T's Horizon Edge technology across a portfolio of 11 retail shopping centre sites. In the 12 months prior, Stockland trialled the technology at three retail sites and was able to achieve significant savings in operational costs. The technology uses "on site high precision meters, weather stations, site BMS and algorithms developed by EP&T from billions of sets of data" to drive efficiencies across the portfolio.

How?

The adoption of this new technology is the result of Stockland Property Group's existing 10-year partnership with EP&T. During this time, the property group utilised EP&T's earlier generation technology – EDGE MARS – to achieve significant reductions in water and energy use across its portfolio of 24 retail centres and 10 commercial office sites.

Outcomes

- *21% reduction across 24 retail sites*
- *40% reduction across 10 office sites*
- *Return on Investment +20%*
- *Improved comfort for occupants through better* managed heating and cooling loads.

16   J LL, Big Data set to shake up facilities management
17   Hitachi, Hitachi's People Flow Analysis Project Optimizing Space Management, 201 5
18   Thau, B. Westf ield creates new data team to help digitize malls, Retail Dive, 2015
19   *https://www.property .nsw.g ov. au/property -portfolio-reporting, viewed December 2016*

20   *https://www.realcomm.com/advisory /579 /1 /microsoft-collecting -500-million-building-data-point s-from-campus-per-day*
21   *http://www.iothub.com.au/news/ineni-realtime-brings-iot-to- barangaroo-419535*
22   *https://www.gresb.com/ept-global-stockland-adopts-big-data-energy- efficiency-analytics*

What's next for data in Australia?

There are opportunities for closer collaboration between industry and government in order to drive greater innovation.

The public Australian Urban Research Infrastructure Network (AURIN) and private Data Republic are both examples of platforms that can be harnessed for industry-government collaboration, connecting data-rich sources with analysts and relevant methods of interpretation. AURIN is an open GIS-based service and Data Republic is a secure data marketplace where:

"Information from the bank systems that process debit and credit cards could be aggregated and offered, for example, to a property developer, to tell them about the sort of products that are popular in a particular geography".[23]

These collaborations are an expansion of traditional real estate analytics models, such as Corelogic RP Data. Corelogic is itself expanding, acquiring start-ups such as Blockbrief which is keyed into local council zoning and legislation changes.

Machvisor, in the US, is another analytics tool that helps *"real estate investors properly assess housing market conditions, price forecasts, risk metrics, demographic shifts and market fundamentals in any given neighborhood throughout the United States".*[24]

While state and federal governments have embraced the need to make data available to the public, there are opportunities for Australia to improve its approach through the use of enhanced open data sets and more coordinated governance.

London, New York, Boston, Manchester, Barcelona, Amsterdam, as well as smaller cities of Songdo, Santander, Bhubaneswar and Aarhus, among others, are leading examples of coordinated programs.

23 Eyers, J . Banks planning big data deals to target customers, AFR, May 23 201 6

24 https://www.quora .com/What-are-some-interesting-data -analysis-done-with-real-estate-data

Lessons

Some key lessons that can be learnt from the cities and companies pioneering property-related data analytics include the need to:

1 Tailor data capture and analysis to solve particular questions rather than having data for data's sake;

2 Ensure comparable datasets are available;[25]

3 Increase awareness of the portals that exist and encourage a diverse user set;[26]

4 Increase partnerships between public and private enterprise;[27]

5 Reduce duplication – share ideas across government so that one solution can be applied across multiple disciplines;

6 Keep procurement simple to encourage more companies to engage with governments on solutions.

Conclusion

The benefits of data analytics to the property sector are becoming increasingly apparent. The challenge of capitalising on this innovation remains in the propensity for government and industry to drive and coordinate such initiatives.

The NSW Government has taken significant steps by establishing the DAC and in concentrating efforts to modernise the management of its extensive property portfolio.

Property Portfolio Reporting, developed by Property NSW, is one such initiative that is allowing agencies greater transparency over their property data, therefore encouraging greater efficiency of the Government's asset base.

Moving forward, there are opportunities for government agencies to increasingly look at data sources such as the workforce profile data developed by the NSW Public Service Commission, in order to guide better decision making around infrastructure and service delivery.

However, the use of data to drive reform is only possible with a concerted commitment from multiple government agencies to ensure whole-of-government information and outcomes. In doing so, the benefits to end users, taxpayers and the public, are substantial.

25   US City Open Data Census, http://us-city. census.okfn.org/about/, viewed December 201 6
26   CUSP, Reducing Data Poverty in NYC, 201 6
27   NSW Government, More Faster Better Open Data Event Report, 201 5

Case Study – NSW Globe

What?

In September 2015, Land and Property Information (LPI) made property sales information freely available for the first time via NSW Globe to help families and investors make better and more informed decisions when buying and selling property.

Previously, anyone wishing to access this information had to purchase it from the LPI website or via a third-party provider.

NSW Globe is a free and easily accessible product that displays NSW Government maps and spatial data, including land parcel, property address and road information.

Using the NSW Globe, buyers and sellers can view and download individual property sales histories going back to 2001, and summaries of street and suburb sales going back five years, free of charge.

Why?

Making property sales data freely available was a commitment of then-Premier Mike Baird.

The initiative is aimed at helping families and investors make more informed decisions when buying and selling property.

The public can now access free bulk NSW Property Sales Information (PSI) from 1990 onwards at valuation.property.news.gov.au

Case Study – Social Housing – Data Analytics Centre & NSW Family and Community Services

Why?

In order to provide better services to support NSW's most vulnerable residents, the Department of Family and Community Services (FACS) sought assistance from the NSW Government's Data Analytics Centre (DAC) to help identify predictors for social housing demand. FACS wanted to bring together data from a range of government departments so it could better understand points of support and how it could potentially divert demand for long-term social housing.

How?

The DAC used machine learning to produce a model that could predict, with 99.26% accuracy, the private rental assistance recipients who would require long-term social housing in the Hunter region.

Outcomes

Further work in broadening the Hunter model to include the whole-of-NSW data will assist FACS in tailoring its services to better manage social housing demand across the State, especially in regard to long-term social housing needs. Insights from the data analysis will also help FACS achieve greater success in identifying the most effective private rental assistance products for its clients.

Property NSW