Folkestone

SMART CITIES
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SMART CITIES

Cities are the engine room of the economy. They provide the setting to facilitate economic activity, innovation and a cohesive, prosperous society. However, at no other point in history have our cities been under pressure like they are at present. Climate change, scarcity of resources, an ageing often overloaded physical infrastructure, population growth, changing demographics, fiscal stress, competition from other cities and increased community expectations are tearing at the fabric of our urban environments.

Cities are complex ecosystems of activity set within a matrix of physical infrastructure, business and human interaction. More than 70% of Australians now live in a city. Across the world more people live in cities (54%) than rural areas (46%) and the UN forecasts this to increase to 66% by 2050[1].

So it is hardly surprising that political and business leaders together with communities are now keenly focusing on looking for new, more effective ways to create more prosperous, efficient, liveable and sustainable urban environments. Cities are embracing the significant advancements in information and communications technology to assist in meeting their objectives. In other words, cities are looking to become smarter. **But what does this mean?**

1 http://esa.un.org/unpd/wup/Highlights/WUP2014-Highlights.pdf

WHAT IS A SMART CITY?

Not surprisingly, there is no commonly accepted definition or framework for determining a smart city.

Given the 'Smart' tagline, many people suggest that it's all about technology, and to some degree that's true; technology is an important enabler and has an important role to play in the operation and management of cities e.g. smart transport, smart mobility, smart energy, smart buildings and so on.

But, it's much wider than that – it's about understanding that the enablers of a smart city go beyond just digital technology. It's about linking human and business capital (networks of people and communities) with digital technology. In other words, creating an ecosystem where people, business and government are interconnected and contributing towards a common vision to create a more productive, prosperous efficient, liveable and sustainable city. Being a smart city is therefore, a means to achieving the vision rather than the vision itself.

The UK-based, Centre for Cities[2], has sought to bring some clarity to the definition of a smart city under three categories – broad, data-driven and citizen focused (see breakout box below).

SMART CITIES DEFINITIONS

Broad Definitions

- The UK Department for Business, Innovation & Skills (BIS) considers smart cities a process rather than a static outcome, in which increased citizen engagement, hard infrastructure, social capital and digital technologies make cities more liveable, resilient and better able to respond to challenges[3].

- The British Standards Institute (BSI) defines the terms as "the effective integration of physical, digital and human systems in the built environment to deliver sustainable, prosperous and inclusive future for its citizens"[4] .

Data-driven Definitions

- IBM defines a smart city as "one that makes optimal use of all the interconnected information available today to better understand and control its operations and optimise the use of limited resources"[5].

- Cisco defines smart cities as those who adopt "scalable solutions that take advantage of information and communications technology (ICT) to increase efficiencies, reduce costs, and enhance quality of life"[6].

Citizen-focused Definitions

- UK Citizens tend to consider a smart city as clean, friendly with good transport connections. In other words they associate with smart cities (although less frequently) include "technology", "connected", "internet" and "modern"[7].

- For the Manchester Development Agency, smart city means smart citizens, where citizens have all the information they need to make informed choices about their lifestyle, work and travel options[8].

Source: Centre for Cities http://www.centreforcities.org/wp-content/uploads/2014/08/14-05-29-Smart-Cities-briefing.pdf

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2   http://www.centreforcities.org/wp-content/uploads/2014/08/14-05-29-Smart-Cities-briefing.pdf
3   https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/246019/bis-13-1209-smart-cities-background-paper-digital.pdf
4   http://www.bsigroup.com/en-GB/smart-cities/Smart-Cities-Standards-and-Publication/PAS-181-smart-cities-framework/
5   http://www.redbooks.ibm.com/redpapers/pdfs/redp4734.pdf
6   https://www.cisco.com/web/about/ac79/docs/ps/motm/Smart-City-Framework.pdf
7   http://www.steerdaviesgleave.com/news-and-insights/launch-of-Connected-Cities-publication
8   www.manchesterdda.com/smartcity/

The Smart Cities Council, a US based organisation focused on creating a network of smart cities, has produced a *Smart Cities Readiness Guide – The Planning Manual for Building Tomorrow's Cities Today*. The Guide provides a matrix across six key issues (planning, infrastructure, system operators, ICT investments, citizen engagement and sharing data) and identified a series of smart city solutions for a range of problems faced by traditional cities (Figure 1). What is clear is that smart cities offer a number of effective solutions across these issues.

FIGURE 1: TRADITIONAL VS SMART CITIES

	The Problem	The Smart City Solution
Planning	• Ad hoc and decentralised • Cost savings aren't realised • Limited potential for scalability of investment	• Coordinated and holistic • Resources are shared • Cost savings are fully realised • Investments are scaleable • Improved city planning and forecasting
Infrastructure	• Runs inefficiently • Costs more money and resources to run	• Optimised with cutting edge technology • Saves money and resources • Improved service-level agreements • Built on open standards
System operators	• Guess at infrastructure conditions • React to problems • Can't deploy resources efficiently to address problems	• Enjoy realtime reporting on infrastructure conditions • Predict and prevent problems • Deploy resources more efficiently • Automate maintenance • Save money
ICT investments	• Piecemeal and siloed • Deliver suboptimal benefit • Don't realise economies of scale	• Centrally planned • Deployed across city departments and projects • Deliver optimal benefit • Provide maximum value and savings
Citizen engagement	• Limited, scattered online connection to citizens • Citizens can't make optimal use of city services (or easily find them)	• Complete and singular online presence • Citizens can easily find and use services • Citizens can participate in smart city initiatives • Two way communications between government and people • Specialised services focused on the individual citizen • Citizens can both contribute to and access realtime intelligent city data and offer apps that use the data
Sharing data	• Departments and functions are siloed • Departments rarely share data and collaborate on initiatives	• Departments and functions are integrated and/or shared • Data is shared between departments and better correlated with other data services through open standards • Results are improved • Costs are cut

Source: Smart Cities Council http://smartcitiescouncil.com/resources/smart-cities-readiness-guide

CITIES AS LABORATORIES

Cities are becoming laboratories for smart, tech savvy innovations. Large and small cities around the world are actively experimenting with digital technologies which can provide creative solutions to urban problems and, properly harnessed, can collectively reshape the economic, operational and social fabric of cities.

Today the Internet has permeated into almost every facet of business and society, not to mention our cities.

The Internet of Things (IoT) and the Internet of Everything (IoE)[9] are key catalysts in the evolution of smart cities. Cities are benefiting from connecting people, processes, data and things through the exponential advancements in information and communications technology. It is expected that by 2020, there will be 50 billion connected devices. Many of these will be in our cities.

Ubiquitous connectivity and the increasing use of sensors and digital devices is enabling the birth of 'smart' urban infrastructure. Combine this with improvements in analytics and cognitive intelligence, and cities are developing tools and systems to better monitor performance, detect patterns, predict trends and visualise spatially large amounts of information.

In doing so, it is enhancing the way cities make informed decisions, how infrastructure is managed, services are delivered and how they communicate, engage and learn from their citizens.

EVOLUTION OF SMART CITIES

The evolution of smart cities over the past five or so years has witnessed three distinct phases according to Boyd Cohen[10], a leading expert in smart cities. Smart cities have evolved from being driven by technology companies to a government driven and finally, to a citizen driven model.

Technology driven, the first phase of the evolution of smart cities was primarily driven by technology companies such as IBM and Cisco who encouraged technology solutions for a range of challenges confronting cities. This phase was characterised by, as Boyd points out, *"technology providers encouraging the adoption of their solutions to cities that were not really equipped to properly understand the implications or solutions or how they may impact citizen's quality of life"*. In effect, phase one was missing out on one key ingredient – how cities interact with their citizens.

Phase two centres on technology enabled cities taking the initiative to be a smart city. In this phase, city mayors and administrators take the lead in determining the future of their cities. They focus on *"technology solutions as enablers to improve quality of life"*. One of the best examples of a city driving the move to become a smart city is Rio de Janeiro. After major floods and mudslides hit the city, the Mayor of Rio de Janeiro went to IBM to seek their expertise to create an integrated command centre to ensure the city had the tools for dealing with a major crisis. The result, a state of the art, 21st century intelligent operations centre that is transforming the way the city operates (see page 11). This is a classic example of how visionary city leaders can harness the power of technology to transform the way a city operates – underpinning their goal to make their cities liveable, vibrant and sustainable communities.

Cities are realising that it is the users of cities – businesses and citizens – that are the key to creating a smart city. As noted earlier, technology is just one of the enablers of smart cities. Phase three smart cities are therefore embracing citizen co-creation models. It's all about citizen engagement and urban entrepreneurship.

As Boyd concludes *"cities need to continue to embrace the innovative capacity of their residents who are able to detect needs before the city administrators can, and who can collaboratively work to fix the problems and improve the city with rapid, cost-effective innovations. Cities must move from treating citizens as recipients of services, or even customers, to participants in the co-creation of an improved quality of life"*.

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9   A network of physical objects, devices, vehicles, machines and buildings which are embedded with sensors, software, and video which enables the collection and exchange of data through the internet. http://folkestone.com.au/folkestone-blog/digital-connectivity-2015-a-watershed-year-but-it-is-only-the-beginning/
10 http://www.fastcoexist.com/3047795/the-3-generations-of-smart-cities

INNOVATION IN CITIES – SMART URBAN INFRASTRUCTURE

Across the globe, there are now numerous examples of smart urban infrastructure in cities.

The list below is by no means exhaustive but provides a selection of projects that embody the spirit of innovation in smart cities:

- smart meters used for metering of power, water and gas that can provide real time measurement of energy consumption;
- high speed Internet services such as fibre optic to the home;
- free WiFi services for mobile Internet access in public locations;
- central thermal plant for centralised power generation and district heating and cooling;
- energy monitoring systems that can measure, calculate and report on the consumption of resources;
- renewable energy systems for the generation of power including solar, hydro, thermal and fuel cell technology;
- smart LED street lighting that incorporates light sensors and communication devices to allow lights to communicate with other nearby lights and to be controlled at a city level;
- smart buildings that contain an array of sensors and technologies that improve safety, security, energy efficiency and usability;
- waste management solutions that detect the levels of waste in garbage bins and the effective management of collection;
- environmental sensors that detect the condition of air, water and soil;
- electric vehicle charging stations;
- smart parking systems for car parks and street parking locations;
- smart irrigation systems for automated watering of parks and gardens;
- CCTV systems for public safety, crowd management and people counting;
- smart cards used for identification, travel and payment;
- smart city operations centre used for monitoring and management of a range of government, transport, environmental and emergency services;
- smart traffic light system used for automated sensing and management of traffic; and
- telecare services that provide remote access to health services.

Source: Parramatta City Council Smart City Masterplan http://www.parracity.nsw.gov.au/__data/assets/pdf_file/0005/163904/PCC_Smart_City_Masterplan-12.08.15S.pdf.

A STRATEGIC PLAN – TURNING AMSTERDAM INTO A SMART CITY

Amsterdam is a great example of a phase three smart city (see page 5) that is an active "living lab" where innovative solutions to the city's problems are trialed, tested, and tweaked in real time and with real citizen and user engagement.

Amsterdam Smart City is a partnership between businesses, governments, knowledge institutions and the people of Amsterdam and is tasked with turning Amsterdam into a smart city. It challenges businesses, residents, the municipality and knowledge institutions to suggest and apply innovative ideas and solutions to urban issues.

Since 2009 Amsterdam Smart City has grown into a platform comprising of in excess of 100 partners, who are actively involved in more than 97 innovative projects. By fostering innovation, facilitating engagement with disruptive technologies, promoting efficient and effective government services, and acting as an advocacy group for open-data, open-government principles, Amsterdam's smart city platform connects all of the city's stakeholders through 'smart' collaborations; bringing them together with the purpose of developing and implementing shared ideas and solutions for the city.
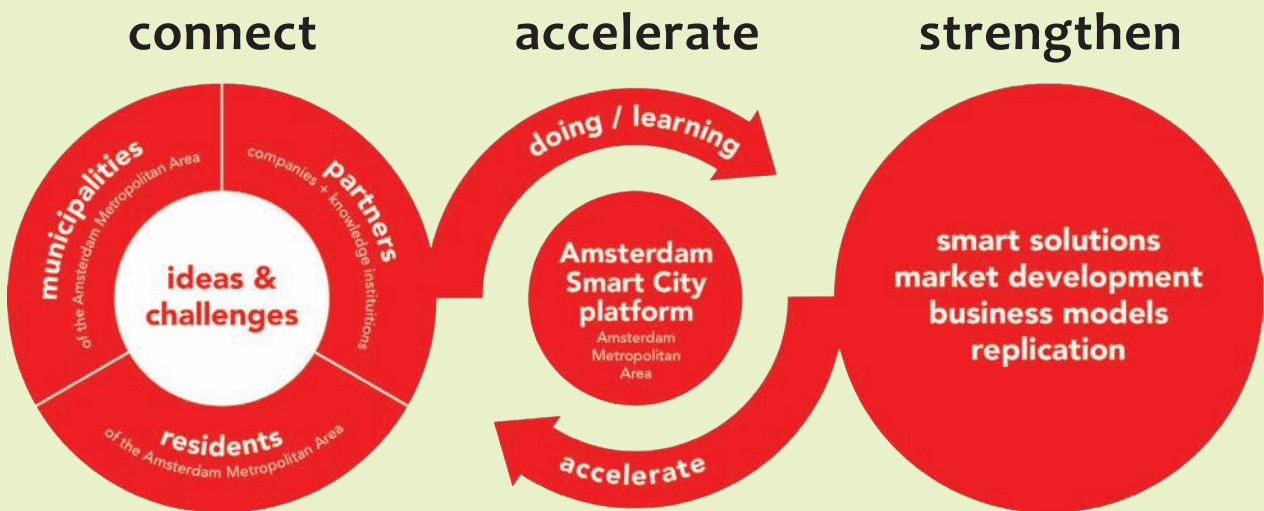
Amsterdam Smart City focuses on five key areas - smart mobility, smart living, smart society, smart areas and smart economy supported by a commitment to big and open data (see page 10), quality infrastructure and living labs where the city can test new products and services in a real life setting.

TECHNOLOGY UNDERPINNING BARCELONA'S TRANSITION TO A SMART CITY

The 2015 Smart City rankings[11], released by Juniper Research, ranked Barcelona as the world's leading smart city, describing Barcelona as *"an exciting model of success from which others can learn, bolstered by strong environmentally sustainable initiatives"*.

Barcelona's BCN Smart City model is at the forefront of applying innovative solutions, harnessing information and communications technology and co-ordinating information and services across departments to manage its services and resources to improve a citizen's quality of life[12].

Barcelona has 24 programs with more than 200 projects that impact almost every urban service. The projects are classified under nine key categories – public and social services, environment, mobility, companies and business, research and innovation, communication, infrastructure, tourism and citizen co-operation.

The **Urban Transformation Project (UTP)** is a key program in making Barcelona a smart city. The UTP focuses on compiling the information received from a variety of sources, and then processes and treats it in order to provide an effective, smart response for the city's services. This information is available to businesses and companies that need it, so they can develop new products and/or services that make people's lives easier.

Two key projects under the UTP are the City OS – the city's operating system and Sentilo.

City OS

The City OS (city operating system) is a technological platform of services and solutions for Barcelona. The platform has been set up to help Barcelona City Council make decisions in real time, in order to meet the needs of governing the city and improve the quality of life of its citizens. This platform has the capacity to acquire and process information on the running of the city quickly, effectively, efficiently and in a sustainable manner. It has smart systems that allow it to analyse and relate events so it can produce simulations and anticipate any problem that might affect the city (including emergency situations).

Some of the City OS objectives are to:

- integrate and correlate city data (sensorisation elements, municipal and non-municipal system databases, social media network data) and transform them into information;
- guarantee the quality of the information stored and security in accessing it;
- enable knowledge of the different services offered by Barcelona to be handled both horizontally (between services) and vertically (to a global supervision centre);

11 http://www.juniperresearch.com/press/press-releases/barcelona-named-global-smart-city-2015
12 http://smartcity.bcn.cat/en

- enable the data to be analysed and predictions to be made based on the data stored;
- run simulations of potential city situations;
- enable event behaviour patterns to be established;
- enable the integration of the services and production platforms through technological architecture; and
- serve as a basis or model for future city platforms.

Sentilo

Sentilo is a technology platform that enables information generated by sensors distributed around cities to be gathered, used and disseminated. The main objective of the Sentilo platform is to provide a functional, open, interoperable and an easily expandable platform based on open-source software. Examples of how the platform is currently being used by the City of Barcelona include energy monitoring in municipal buildings, obtaining data related to noise pollution levels as part of the Strategic Noise Map and work is underway setting up an information system on rubbish collection, as well as studying the roll out of a remote controlled watering system in its parks and smart lighting solutions throughout the city.

Sentilo was initially built to be used as the sensor platform for the Barcelona City Council. After its deployment, the City Council has released the code under a free and open source software license, to allow it to fit in the smart city architecture of any city who looks for openness and easy interoperability.

The **Health and Social Services Program** is another key program in Barcelona's quest to be a leading smart city. The focus is on applying new technologies to optimise public and social services helping to create a more inclusive and skilled society and, above all, improving people's quality of life. Telecare is one of a number of intiatives under the cities Health and Social Services Program.

Telecare

Social care for vulnerable people has become one of this municipal government's main focuses, in order to make Barcelona a city that is more sensitive towards and supportive of groups of people that need special care. One of the most socially positive projects under the BCN Smart City model, health and social services programme is Barcelona's Telecare service.

Barcelona City Council currently provides this service for free to more than 70,000 citizens who are over 75 years old, or disabled or are deemed by a social worker to be in need of the service. A device is installed in the individual's home and connected through a (land or mobile) telephone line to a Call Centre, which can be contacted at the simple press of a button. The Call Centre has a team of professionals who attend to requests and mobilise, where necessary, the most appropriate response for the situation: locating family members or designated contacts, sending a Mobile Unit out to the user's home or mobilising other emergency services.

OPEN DATA

There are significant amounts of data generated and collected every day in cities by government departments, businesses, communities and even individuals. Information on land use, development, buildings, transportation, other government services, physical infrastructure, mobility, tourism and demographics are all available in various forms. The question for cities is how they can harness that data in real time to improve fact based decision making around the operations of the city and the provision of services to key stakeholders.

Open data is data that anyone can access, use and share. It's about transparency, giving access to public data in standard, open, digital formats, that are clearly structured and easily understood. In this way the public, any business or institution can access data easily and find out information about the city, or analyse that information to create data smart city solutions.

Open data also facilitates innovation – enabling software developers to transform that data into useful applications that make information on city services available anytime, anywhere. One just has to see the proliferation in apps providing information on transport services - the best route, timetable etc. to see the benefits of open data.

The concept is also applicable within government. It facilitates the breaking down of silos to create information transfers across departments to generate new insights and trends and allow more indepth analysis of issues leading to a more coordinated and effective allocation of resources and service responses.

OPEN DATA - BLOOMBERG PHILANTHROPIES

Former New York Mayor, Michael Bloomberg's not for profit organisation, Bloomberg Philanthropies, is fostering a program to promote *"public sector innovation capacity and spread proven and promising solutions among cities worldwide"*. As part of the program, the organisation exposes the use of Big Data or Open Data[13] to *"access opportunities, measure progress, evaluate impact and improve performance"*. It is encouraging mayors and cities to better use data and evidence to engage the public, improve services, evaluate progress, and fund *"what works"*.

13 http://www.bloomberg.org/program/government-innovation/what-works-cities/

INTEGRATING SYSTEMS AND PROCESSES - CONTROL CENTRE - RIO DE JANEIRO

Rio de Janerio has been recognised as a smart city, principally, because of its state of the art, 21st century Intelligent Operations Centre (IOC). The IOC allows city officers to coordinate its city services in real time – from responding to emergencies to unlocking traffic congestion. The IOC was opened in 2010 in partnership with IBM and has set the benchmark for how a city can integrate key functions of a city. The IOC brings together the information and processes of more than 30 different departments in a single digital command-and-control system. The IOC is redefining how information is collected and interconnected to get a smarter view of what is happening in the city at any point in time. The IOC exemplifies the principle that only by considering and coordinating the various city functions in a holistic way underpinned by an innovative technology platform, can city leaders manage the daily functioning of a large, modern city.

The IOC has integrated the information systems and processes of more than 50 city agencies and private sources. Officials from across the city collaborate to manage the daily functions of the city.

The IOC, which provides an overview of how the city is functioning in real time, uses integrated business analytics and intelligence with predictive trend analysis to predict emergency situations and coordinate the city's reaction to them. The IOC collects data from multiple sources including security cameras, water and rain gauges, traffic signal and control data, public transit and municipal vehicles, the electricity grid, and social media feeds.

The centerpiece of the IOC is the digital wall with 80 high resolution screens displaying data from hundreds of cameras and sensors located throughout the city in real time.

The IOC also employs a high resolution weather-forecasting and hydrological-modeling system that can predict heavy rains up to 48 hours in advance. Forecasts are based on a unified mathematical model that pulls data from the city's river basin, topographic surveys, the municipality's historical rainfall logs and radar feeds. Along with predicting rainfall, the system can anticipate flash floods and mudslides, and the city has begun to evaluate the effects of weather on traffic and on the supply of electricity.

The IOC also has state of the art communication tools to allow citizens to have access to accurate information of what is happening in their city 24 hours a day, 7 days a week.

MOBILITY

As our cities get larger and more populous, managing mobility and congestion are some of the most pressing challenges a city faces. For a city to effectively function it requires an efficient movement of people, goods and supplies. Efficient and affordable transport connections are key to not only generating economic growth but also facilitating community interactions with the city.

Rapid technological advances coupled with shifts in demographics and public preferences are significantly altering the nature of transportation in cities. Bicycle and public transport usage is up in most cities. Digital disruption has seen the rise of Uber and car sharing pools such as GoGet in Sydney which gives you all the benefits of a car, without the hassle and expense of owning one, by being able to access a network of cars parked in your local community.

At the same time, technology is allowing better management and coordination of transport infrastructure.

ENHANCING MOBILITY - SFPARK - SAN FRANCISCO

SFpark[14] is San Francisco's system for managing the availability of on street parking. It uses better information, including real-time data where parking is available, and demand-responsive pricing to help make parking easier to find.

The San Francisco Municipal Transportation Agency (SFMTA) commenced a trial in 2011 with 25% of the city's meters. At the heart of the SFpark approach is demand-responsive pricing, whereby the SFMTA gradually and periodically adjusts rates up or down at meters and in car parks. When pricing changes, new rate information is sent wirelessly to the meters so they remain up-to-date.

The aim is to achieve a minimum level of availability so that it is easy to find a parking space most of the time and that car parks always have some open spaces available. Furthermore, meeting target availability also means improving utilisation of parking so that spaces – on street or off street – would not sit idle. In effect, demand-responsive pricing encourages drivers to park in underused areas and car parks, reducing demand in overused areas.

In addition, parking information is made available on the SFpark.org homepage, and information on parking availability is also distributed via a free SFpark iPhone app, Android app, and the region's 511 phone system.

The SFpark trial showed that demand-based pricing can improve parking availability without increasing double parking, congestion, or parking citations. During the trial period, cruising for a parking spot was cut by 43%, and meter-related parking tickets cut by 23% while average on street meter rates dropped by 4%, and double parking dropped by 22%.

In early 2015, SFMTA announced all of San Francisco's 29,000 parking meters had been upgraded to "smart meters" so they are now enabled for demand-based price changes throughout the day.

14 http://sfpark.org/

Smartphones have enabled users to access transportation information and connect with transport providers instantaneously. Whether it be to check traffic congestion, public transport times or the best route to take to get from point A to point B.

Also, many cities are experimenting with ways to use technology to manage parking within cities. People looking for parking spaces in cities create significant congestion as they circle looking for an available parking space. San Francisco has developed a parking app that helps drivers find a parking spot at the same time as periodically adjusting meter and carpark pricing up and down to match demand (see page 12). This demand-responsive pricing encourages drivers to park in underused areas and car parks, thereby reducing demand in overused areas.

Smart cards are now being used for more than just public transport. Hong Kong's Octopus card, a multi-functional smart card first developed for their public transport network, now offers payments across a range of services and products in Hong Kong (see breakout box). Australian cities such as Melbourne have the Myki while Sydney has recently introduced the Opal Card – neither have yet to be expanded to the broader usages of the Hong Kong Octopus card.

SMARTCARDS POINT THE WAY FORWARD - OCTOPUS CARD - HONG KONG

The Octopus Card in Hong Kong is a multi-functional smart card that not only facilities e-payments across public transport but also in shops, libraries, hospitals, schools, leisure facilities and parking meters, but also provides access to a growing number of residential and office buildings. Not to mention it collects a huge amount of information on the daily travel patterns of its users which can be analysed and acted on to generate better transport outcomes.

The acceptance and breadth of reach of Octopus is staggering. There are more than 29 million Octopus cards in circulation, 99% of Hong Kong people (aged 15-64) possess an Octopus, more than 13 million transactions a day are recorded, more than 16,000 retail outlets from over 7,000 service providers accept Octopus and there are more than 70,000 Octopus readers all over Hong Kong.

Source: www.octopus.com.hk

"Rapid technological advances coupled with shifts in demographics and public preferences are significantly altering the nature of transportation in cities"

Technology is changing transport behaviours and the leading smart cities are thinking differently about how goods and people move throughout a city. Looking ahead, extensive work is underway by technology companies such as Alphabet Inc. (Google) and the traditional car companies Volvo, Damieler and GM to develop driverless cars.

However, a recent report from a US advocate group, The National League of Cities entitled *The City of The Future: Mobility and Technology*[15], examined current transport trends in 68 US cities, and looked at future developments in the urban environment.

The study found:

- widening gaps between innovation in the private sector, the expressed preferences of citizens and the visions of city planners regarding transportation investment;

- driverless cars will also become more prevalent in the next five years and beyond, creating new types of transportation networks involving public, private, and even freight transportation, however only 6% of city plans take into account the impact of driverless technology; and

- a majority of cities do not have concentrated efforts to prepare for new transportation innovations, with only 3% of cities having plans that take into account private transport companies such as Uber or Lyft, despite the fact they operate in 60 of the 68 cities in the study.

For those that don't believe cities will have driverless cars, the US government recently announced that they are proposing to spend nearly US$4 billion in the next decade to accelerate the acceptance of driverless cars on US roads.

"The implications of driverless cars on our cities will be enormous. More efficient movement of people, less congestion, better safety. It's coming – it's just a matter of when!"

15 http://www.nlc.org/Documents/Find%20City%20Solutions/Research%20Innovation/City%20of%20the%20Future/City%20of%20the%20Future%20FINAL%20WEB.pdf

COLLABORATION

Adding intelligence to urban infrastructure through technology is just one part of the equation. We cannot lose sight of the importance of people and collaboration.

Individuals are becoming more digitally savvy. Social media and social apps are changing people's expectations of access to information, accountability and interaction. Social media platforms such as Facebook, Twitter, Instagram and LinkedIn have become popular platforms for forming and supporting online communities of interest.

Smart cities, through these and their own social media platforms and apps, are seeking to engage all key stakeholders - individuals, communities and businesses – within a collaborative environment, which encourages the sharing of knowledge, experience and insights to assist in finding and implementing solutions to the many economic, social and environmental challenges facing cities.

Three examples of smart cities using technology and digital platforms to actively engage with their citizens can be found in Melbourne, Boston and Chicago.

Participate Melbourne[16] (see page 16) is a community engagement portal which provides an online interface for the public to provide feedback across a range of diverse projects affecting the city.

Boston has put in place a crowd sourcing project called Speed Bumps[18] (see page 16), to collect data on the condition of their roads, providing the city with real time information.

Open311 in Chicago[17] (see page 17) is an online website that allows citizens to report and track non-emergency issues in public spaces. Common issues include potholes, broken street lights, garbage, vandalism, and other problems that compromise public spaces and infrastructure.

Technology is allowing people to work anywhere, anytime, but as even technology companies are finding, innovation thrives when people come together to collaborate and share information.

CBDs and inner areas, rather than business tech parks on the fringe are now magnets for technology companies. Today's technology companies want to locate in areas close to where the talent that powers them (the human capital) wants to live, work and play. That means in locations where there is amenity (bars, restaurants, and entertainment) and where they can walk, bike or use public transport to commute to work. Technology companies also want to locate near their end-users, the customer, so they too can collaborate.

TECH HUBS - COLLABORATION LABORATORIES

Across cities, co-working spaces, or hubs as they are more commonly known as, are springing up to allow tech start ups to gravitate to a shared working environment that foster collaboration. Startups can establish connections, build networks and grow without the overheads that come with traditional office space.

The Sydney CBD and surrounding suburbs now have a number of tech hubs - Tank Stream Labs, Fishburner, VibeWire, HubSydney, the WorkBench and more recently, Stone & Chalk[19], a fintech hub.

Fintech is one of the fastest growing sectors in the financial services industry globally. Digital disruption is transforming the financial services industry by revolutionising payment systems and creating new forms of financial services delivery through peer-to-peer lending, crowd-funding, automating financial advice and crypto-currencies to name a few.

Stone & Chalk is an independent, not for profit fintech hub whose overarching objective is to incubate and nurture financial services-focused tech start ups. It is a physical

"centre of gravity" that allows start ups to locate in one location (50 Bridge St in the heart of the financial core of the Sydney CBD) and collaborate with mentors from financial institutions, technology companies, leading academics and universities, government and regulators. The NSW government is backing the initiative, which is also being funded by Australia's biggest banks and financial institutions, including Westpac, ANZ Bank, Macquarie, Suncorp, AMP, HSBC and IAG. Leading corporates outside the financial services sector, including Woolworths, Amazon, Intel, Optus, Oracle, KPMG and Veda, have also come on board to lend their support and provide funding.

Since opening in mid 2015, Stone & Chalk has grown to 178 permanent residents and 58 companies who have access to dedicated labs, full and part time desks, offices and casual drop in spaces. Stone & Chalk epitomises that "place matters" in accelerating collaboration and innovation within cities and hubs such as these, will be critical if cities are to attract and retain talent in the digital era.

16 http://participate.melbourne.vic.gov.au/
17 http://www.cityofchicago.org/city/en/depts/311.html
18 http://www.streetbump.org/
19 http://stoneandchalk.com.au

ENGAGING CITIZENS - PARTICIPATE MELBOURNE - MELBOURNE

The Melbourne City Council is embracing the concept of utilising technology to enhance collaboration with its citizens. Participate Melbourne was launched in July 2013 to provide an additional online avenue for members of the community to understand and contribute to the decisions that shape Melbourne's future.

The online community complements rather than replaces existing engagement activities and supports the Council's commitment to being a more accessible, transparent and responsive organisation. Through Participate Melbourne, the Council is improving the opportunities for people to participate in and engage with their activities and decision making. All comments, ideas and suggestions are collated and used to inform Council decision making processes for the development of strategies, programs and activities. The communication is two way - the Council also shares information about its decisions and performance and let's the community know how their views have influenced what they do.

SMART APPS - MAKING CITIZENS FEEL EMPOWERED
STREET BUMP - BOSTON

Street Bump, a project of the Mayor's Office of New Urban Mechanics, helps Boston's residents improve their neighbourhood streets. As users drive, the mobile app collects data about the smoothness of the ride; that data provides the City with real time information it can use to fix problems and plan long term investments.

Residents use Street Bump to record "bumps" which are identified using the device's accelerometer and located using its GPS. Bumps are uploaded to the server for analysis. Likely road problems are submitted to the City via Open311, so they get fixed (e.g. potholes) or classified as known obstacles (e.g. speed bumps).

CUSTOMER COLLABORATION AND CITY ACCOUNTABILITY - OPEN 311 SYSTEM - CHICAGO

Chicago's new Open311[22] brings unprecedented new levels of openness, innovation and accountability to the delivery of a city's services. The Open 311 project and its website[20], allows residents to make, and track a wide range of service requests, such as road damage, faulty lighting or abandoned vehicles.

Using a mobile device or a computer, citzens can enter information (ideally with a photo) about a problem at a given location. This report is then routed to the relevant authority to address the problem. What's different from a traditional 311 report (a US standard for requesting city services used by cities across the US. While 911 is for emergencies, 311 systems for all other calls) is that this information is available for anyone to see and it allows anyone to contribute more information. By enabling collaboration on these issues, the open digital online model makes it easier to collect and organise more information about important problems. By making the information public, it provides transparency and accountability for those responsible for the problem. Transparency also ensures that everyone's voice is heard and in turn encourages more participation from the community.

"Smart cities are seeking to engage all key stakeholders – individuals, communities and businesses within a collaborative environment, which encourages the sharing of knowledge, experience and insights to assist in finding and implementing solutions to the many economic, social and environmental challenges facing cities"

20 https://www.chicagoworksforyou.com

SMART CITIES
IN AUSTRALIA

Smart cities are gaining momentum in Australia. A number of cities including Sydney, Melbourne, Adelaide and Geelong ,have embarked on implementing 'smart city' strategies.

BECOMING A SMART CITY – PARRAMATTA CITY

The most recent city to jump on board is Parramatta. In August 2015, the Parramatta City Council released their Smart City Masterplan[21].

The Masterplan is clear about what the Council wants to achieve: *"Parramatta will be a Smart City that leverages the foundations of good urban planning, transparent governance, open data and enabling technologies that will underpin our position as a vibrant, people-centric, connected and economically prosperous city"*.

The Master Plan then goes on to say that Parramatta's mission as a smart city is to:

- be a highly liveable, technologically enabled, active and desirable place to live, work and visit as Australia's next great city;

- develop an environment that encourages and leverages the synergies between centres of excellence in research, technology, education, health, enterprise and creativity; and

- plan for outcomes that drive economic competitiveness, improves safety, enhances mobility, improves environmental sustainability, enriches social and community connections, embraces cultural diversity and celebrates our heritage.

THE LIGHTHOUSE CITY - ADELAIDE

Adelaide is another Australian city looking to establish itself as a leading smart city. The city is working with Cisco on a number of smart city projects. In February 2015, Cisco designated Adelaide as its first smart and connected 'Lighthouse City' (Cisco's term for cities around the world offering multiple technological solutions to address key challenges faced by that city) in Australia.

According to Cisco, Adelaide has joined other major cities including Barcelona, Chicago, Hamburg and Dubai as leading places to showcase Internet of Things (IoT) innovations. As a Cisco Lighthouse City, Adelaide is now a test bed for implementing advanced IoT solutions for city infrastructure management and is developing and piloting new urban services and solutions to benefit their customer and citizen experiences.

As part of the collaboration between Cisco and the City of Adelaide, Cisco has recently created a smart city studio to enable innovators to develop, test and commercialise next-generation IoT applications and services, and to connect the City of Adelaide, and its businesses, entrepreneurs and citizens to IoT opportunities. They can also connect with Cisco's Innovation Centres worldwide to leverage off innovations being developed in other leading smart cities - global collaboration.

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21 http://www.parracity.nsw.gov.au/__data/assets/pdf_file/0005/163904/PCC_Smart_City_Masterplan-12.08.15S.pdf

THE FUTURE

Cities worldwide are striving to become smart cities driven by the need to generate economic activity, foster employment, deliver services more efficiently and effectively, improve mobility, achieve higher levels of sustainability and engage with, and better serve the needs of their community.

Advances in technology are serving as a critical agent of change. Smart cities are leveraging technology across buildings, infrastructure and service delivery to provide creative solutions to the 21st century challenges of our cities.

However, smart cities are not just about deploying technology. People and places are at the core of cities. Successful smart cities of the future will be the ones that go beyond just being more automated and tech savvy to ones that can attract knowledge, skills and innovation capabilities, and can bring together transparent governance, quality urban planning, open data and effective collaboration between all key stakeholders to create quality urban environments which are more prosperous, efficient, liveable and sustainable.

ABOUT FOLKESTONE

Folkestone (ASX:FLK) is an ASX listed real estate funds manager and developer providing real estate wealth solutions. Folkestone's funds management platform, with more than $917 million under management, offers listed and unlisted real estate funds to private clients and select institutional investors, whiles its on balance sheet activities focus on value-add and opportunistic (development) real estate investments.

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