



IoT AND GOVERNMENT'S ROLE IN THE DEVELOPMENT OF CITIES

**SUBMISSION TO THE STANDING COMMITTEE ON
INFRASTRUCTURE, TRANSPORT AND CITIES**

IoT Alliance Australia
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Further information regarding this submission can be obtained from the IoT Alliance Australia www.iot.org.au or contacting Catherine Caruana-McManus Chair of the Smart Cities and Industries Work Stream at Catherine@giantideas.com.au.

1. ABOUT IOT ALLIANCE AUSTRALIA

IoTAA is the peak national body representing Australia's Internet of Things (IoT) industry, with over 250 member organisations, and over 500 individual participants across seven Work Streams.

Our vision is to empower industry to grow Australia's competitive advantage through IoT.

Our purpose is to accelerate IoT innovation and adoption by:

- activating and supporting collaboration across industry, government, research and communities;
- promoting enabling, evidence-based policy and regulation; and
- identifying strategic opportunities for economic growth and social benefit.

The IoTAA has seven Work Streams each with a Chair and significant representation from academia, industry and government. The Work Streams cover, **industry collaboration, data availability and privacy, security and network resilience, spectrum availability, sectoral engagement** (smart cities and industries), **IoT start-up innovation** and **platform interoperability**.

For more details about IoTAA, see www.iot.org.au

2. OVERVIEW

IoTAA welcomes the opportunity to make a submission to the inquiry on the role of the Australian government in the development of cities.

Our submission has been prepared by the IoTAA Smart Cities and Industries Work stream which is focused on the sectors of energy, water, transport, agriculture and smart cities. The Work Stream has over 60 members of major telecommunications companies, IoT start-ups, industry groups and relevant government agencies.

The IoTAA understands that your key areas of interest include:

- 1) Sustainability transitions in existing cities
 - a. Identifying how the trajectories of existing cities can be directed towards a more sustainable urban form that enhances urban liveability and quality of life and reduces energy, water, and resource consumption;
 - b. Considering what regulation and barriers exist that the Commonwealth could influence, and opportunities to cut red tape; and
 - c. Examining the national benefits of being a global 'best practice' leader in sustainable urban development.
- 2) Growing new and transitioning existing sustainable regional cities and towns
 - a. Promoting the development of regional centres, including promoting master planning of regional communities;
 - b. Promoting private investment in regional centres and regional infrastructure;

- c. Promoting the competitive advantages of regional location for businesses;
- d. Examining ways urbanisation can be re-directed to achieve more balanced regional development; and
- e. Identifying the infrastructure requirements for reliable and affordable transport, clean energy, water and waste in a new settlement of reasonable size, located away from existing infrastructure

This inquiry will benefit from the convergence of a number of disciplines. These disciplines include land use planning, economic development, environmental management, finance and technology.

This submission will focus on technology and provide a summary of the IoT opportunity for Australia as it relates to cities and regions as well as details of global best practice use cases relating to the use of IoT.

As the leading expert industry group in Smart Cities and IoT in Australia, we have defined essential critical success principles required to effectively and efficiently grow smart infrastructure and smart cities using IoT for Australian cities.

These "pillars" are:

1. Open standards, data sharing and application interoperability;
2. Applying global best practice of which we have identified Singapore, Milton Keynes & Bristol in the UK, Amsterdam in the Netherlands, Barcelona in Spain and Songdo in Korea as leading exemplars of how connected cities and IoT is bringing better livability, economic opportunity and environmental outcomes to people; and
3. Integrated IoT platforms for Smart Cities that can easily "plug-in" the various solutions such as smart parking, smart bins, LED lighting, pollution monitoring, integrated energy, water and waste.

Machina Research analysis shows that using non-standardized versus standards-based solutions for IoT will increase the cost of deployment, hinder mass scale adoption, and stifle technology innovation for smart city initiatives worldwide. City authorities and their technology partners could squander USD341 billion by 2025 if they adopt a fragmented versus standardized approach to IoT solution deployment. (<https://machinaresearch.com/report/the-success-of-the-smart-city-depends-on-interoperability-achieved-through-standards-and-layered-architectures/>)

In summary, IoT drives innovation and improves outcomes across cities and regions, only when point solutions can multiply their benefits using interoperable practices and a willingness by city infrastructure owners and operators to share data so that the holistic efficiencies can be gained across entire systems.

The IoT Alliance would like to see a more unified approach to data sharing at all levels of Government and Industry. Rather than the Federal Government funding city based projects directly, we would recommend that Federal Government help fund State based data sharing infrastructure and policies/rules so that all cities and regions can leverage state based as well as federal information. Through this model, local councils can share and use data in a more consistent way as well as relieving them of the burden of developing their own frameworks for sharing which typically they do not have the experience to do without significant learnings.

Case studies and references to the use of technology in this paper refer to the application of innovation to “Smart Cities”. The term Smart Cities is used for simplicity. It should be noted that these initiatives can be delivered for communities in a number of contexts (cities, suburbs, regions) and in a number of industries.

3. OUR VISION - CREATING BENEFIT FOR COMMUNITIES

Australian cities rank highly in international comparison indices in the areas of quality of life, global connectivity and social condition of people, with Melbourne and Sydney ranked in the top 10 World's most livable cities.

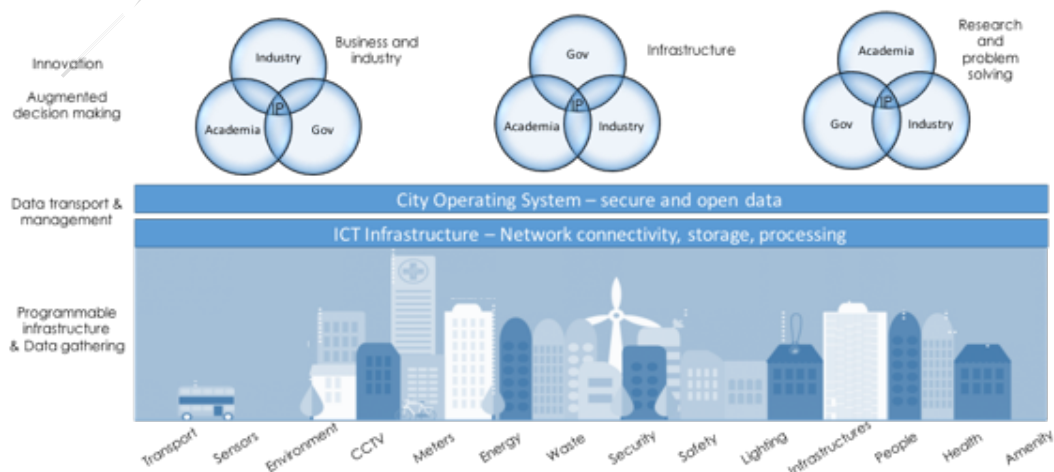
However, there is strong evidence to suggest that Australian cities rank to a lesser degree with respect to infrastructure, traffic congestion, low carbon living, environmental management as well as “smart city” innovative solutions.

The IoTAA is keen to position Australia as a leader in Smart Cities and IoT that leverages our competitive strengths and unlocks the potential of our cities and regions to be economic powerhouses now and in the future.

Our vision is to adopt an interoperable and secure framework for open data sharing and to promote agile methods and fast prototyping to accelerate the deployment of smart sensor networks to bring innovation to our cities and critical infrastructure networks.

The **city as an innovation platform** model seeks to avoid “vendor lock-in” of smart cities solutions and instead, through collaborative partnerships across government, academia and industry, cities can more cost effectively and rapidly deploy their own smart cities needs across the spectrum of smart innovations for transport and mobility (public, private, EVs) smart parking, LED street lighting, smart bins & waste management, smart grids & renewables, water and waste management, environmental management, smart agriculture, public safety, connected healthcare and education.

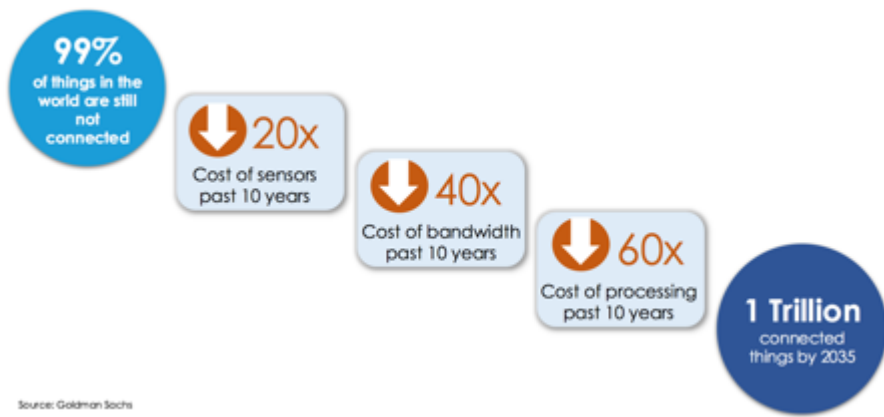
The City as a Platform for Innovation



4. THE IOT OPPORTUNITY

The Internet of Things (IoT) promises major technology development that will transform 'vertical' industry productivity, innovation and business opportunities. IoT offers Australia significant and transformational economic benefit through smarter use of infrastructure, smart cities and intelligent asset management. Specifically, in the context of Smart Cities, a key 'sector' for IoT, it is clear that cities increasingly have to compete with each other for global (and Australian) talent. Cities are also under strong pressure to be smart enough to support the digital transformation of our nation.

Multiple studies by industry and research organisations put the potential global annual GDP benefit of IoT at up to US\$11 trillion. **This translates into an opportunity for the Australian economy of up to AUD\$120 billion by 2025¹ – however this is contingent upon Australia increasing its current competitiveness.**



We see it as imperative for Australia to leverage IoT technology as a key lever to innovate and increase competitiveness on the world stage.

Leading IoT countries are focussing on areas that 'make sense' with respect to their existing strengths and aspirations. Germany and the US, for example, are leveraging their manufacturing strength to focus on the industrial and manufacturing dimensions of IoT. Germany is rallying around the Government's *Industrie 4.0* initiative. South Korea and the US are targeting the automotive and transport sectors while Singapore, UK, China, The Netherlands and India see Smart Cities as a Government-led focus.

¹ *Enabling the Internet of Things for Australia*, Communications Alliance, October 2015

5. SMART CITIES AS AN ENABLER FOR COMPETITIVE ADVANTAGE

So now is the time for Australia, through government leadership and industry engagement to pave the way for efficient, sustainable and productive cities, as the engine room of the economy.

At a city level, emerging disruptive technologies such as open data, analytics, mobile, cloud, social media, "crowd sourcing" (e.g. Kickstarter) and the "sharing economy" (e.g. Uber, AirBnB), are enabling cities to embrace smarter ways to design, build and operate their critical infrastructure, provide new citizen centric services and create new industries.

The "Internet of Things" refers to where connectivity and information can be shared between people and devices or between automated systems, brings these disruptive components of digital transformation together by enabling **smart cities open data platforms** for cities.

IoT uses analytics to predict and control the future and comprises of sensor/actuators, communications/connectivity, data analytics and security and smart applications that can be delivered to web and mobile interfaces.

For local business is it about seeking new operational efficiencies and creating new connections with suppliers and customers;

For governments, IoT aims to create a platform for smarter cities solutions and a better way to deliver a wide range of services.

For universities, IoT provides a new way of innovation and collaboration across a whole range of disciplines from advanced manufacturing, engineering and construction, information technology, telecommunications, automation, robotics, agribusiness, connected vehicles and telematics.

And for the start-up and entrepreneurial community, IoT is becoming one of the fastest growth areas to create new businesses and transform existing industries using the next generation of the Internet.

Around the world, cities have incorporated 'Internet of Things' technologies into a range of smart city management solutions.

IoT drives innovation & improves outcomes across cities



Public Safety

- Situation awareness
- Security, surveillance video & drones)
- Weather, flood & events monitoring



Energy & Renewables

- Sustainable use
- Load management
- Resource optimisation
- Waste to energy



Infrastructure & Resources

- Asset management & tracking
- Robotics, autonomy & safety
- Infrastructure maintenance
- Resource optimisation



Smart Cities

- Asset management & tracking
- Smart parking
- Smart bins & waste management
- LED street lighting



Smart Vehicles

- Driver assistance
- Video evidence
- Maintenance management
- Autonomous operation
- Safer, better utilisation, sustainable



Urban Farming

- Vertical & rooftop gardens
- LED lighting & hydroponics
- Food security & safety
- Farm to fork
- Smart warehousing
- Smart supply chains

6. GOVERNMENT AND INDUSTRY WORKING TOGETHER

IoTAA would welcome the opportunity to work more closely with Government to drive the Smart Nation and Innovation Agenda for Australia. We believe there are a number of ways that we can help local councils and government in delivering their smart cities plans and smart infrastructure agenda. Some of these include:

- Deep Collaboration where we can build strong partnerships across the spectrum of planning, design, build and operating city systems and infrastructure with a focus on Smart Cities opportunities and challenges in implementation. Given our expertise in addressing ways forward with regards to issues such as privacy, security, spectrum allocation, data interoperability and integration, we believe we would be an excellent “sounding board” for councils seeking to assess the optimum way forward for their connected cities, energy, water, transport and environmental management initiatives.
- Assist governments to design an appropriate “innovation clause” that could be included in contracts for new infrastructure and upgrades of existing public use infrastructure and city related services (transport, energy, water, waste, hospitals, schools). The clause would encourage data sharing, interoperability, building information modelling (BIM) and smart sensor networks for city renewal or development. The Hudson Yard precinct in New York and the Old Oak Commons redevelopment in London are two examples of where IoT smart sensor networks will enable intelligent asset management to realise operational efficiencies of the city as well as provide the backbone for the array of smart cities applications across environment, parking, lighting, waste, transport, connected healthcare etc.
- Identifying the critical “killer” problems for cities (e.g. traffic congestion) working together with research and industry members to using agile and learning by doing methods to fast track data sharing and deployment issues. We would welcome the opportunity to conduct a number of “reverse pitching” workshops where local councils and government agencies tell us what issues they are trying to address by which better real-time data and smart sensor networks may be able to assist and using the Hypercat UK model for interoperability of IoT generated data to deliver open data hub and seamless integration of applications.
- Funding of start-ups similar to the UK model, where partnerships are made between councils and start-ups who agree to solve a city problem together and the solution is replicable to take to other cities.
- Promote the principles of open standards technology, such a public access IoT networks and open data hubs for sensor data. Building on work done by the NSW Government Data Task Force, and leveraging our three layers of Government, support State based Data sharing frameworks that can be leveraged by all city and regional smart initiatives.

7. IOTAA RECOMMENDATIONS

In light of the information provided in this submission, the IoTAA is looking forward to working collaboratively with the Committee to inform the development of its report. We have tabled a few sector specific recommendations for consideration below.

7.1 The Australian Government as a Catalyst

A survey conducted by the International City/County Management Association (ICMA) and Smart Cities Council and released in September, 2016, asked State and City administrators about barriers to implementing smart city and IoT technologies in their jurisdictions. Among the findings:

- a. Budget constraints – 42% of respondents described budget limitations as a "very significant barrier" and another 32% called it a "significant" barrier.
- b. Complexity of procurement as a barrier – only 7% suggested procurement is not a barrier.
- c. Need for more supportive policies – the majority of respondents (37.2%) consider it a moderate barrier while 25% describe it as a very significant or significant barrier.

To enable our cities, regions and towns to realise the benefits of smart technologies, we need to refresh dated policies and practices that impede progress. Specifically, we need to help them:

- Develop capacity – unlock innovation
- Aggregate demand – unlock legal boundaries
- Streamline procurement – unlock antiquated approaches that hamper efficiency
- Embrace new financing models – unlock municipal financing barriers
- Benchmark results – unlock the limitations of one-dimensional metrics

The Australian Government offers a unique coordinating role (in collaboration with State and Territory Government) for developing the capacity of our regions, cities and towns to learn about and implement smart solutions. Given that these solutions can be used in almost any size community anywhere, the key to successful implementation is to:

- Provide guidance and resources for cataloguing solutions, case studies and best practices to demonstrate the value and utility of these solutions
- Provide assistance and guidance through educational outreach with workshops and programs to assist cities and towns in aggregating demand and benchmarking results
- Encourage industry-led standards and interoperability development
- Encourage streamlining of procurement through supporting policies, and using the City Deals process as a key mechanism for catalysing IoT and smart cities deployment.
- Look at opportunities for Government and larger industry players to be 'early adopters' of IoT lighthouse projects.

7.2 State Based Smart Cities Platforms & Data Sharing Framework

- i. Support a state based data sharing framework that all cities and regions can leverage to facilitate open, standards based and consistent exposure and use of data while uniformly protecting privacy, commercial interests and human rights.

7.3 Smart Cities & Precincts

- i. Encourage open and interoperable IoT Platforms that enable horizontal views across the solutions e.g.: smart parking, LED lighting, public safety, smart buildings, smart grids, smart bins, city amenity etc.
- ii. Encourage city infrastructure owners & operators to share data to release tension in the network and to enable easier identification and sharing of data using standards, such as Hypercat (hypercat.io)
- iii. Fund local councils for IoT platforms that are community enabled, open and interoperable. Identify leading cities to accelerate adoption and collaboration. E.g.: Ipswich, Wollongong, Melbourne.
- iv. Encourage crowd sourced innovation that includes citizen participation and that leverages IoT to build new applications and services. E.g.: Flood Network (UK) Chicago Array of Things (US), The Things Network (The Netherlands).

7.4 Energy & Water

- i. Encourage shared use of IoT assets to reduce the cost of delivering smart metering and distribution network monitoring, including renewables and battery storage.
- ii. Review global application of IoT solutions leading to reduced costs/increased operational efficiency. Apply appropriate 'rulings' to enable the utility community to leverage these benefits.
- iii. Enable a funded IoT capability to 'bring forward the benefits' in asset management and customer engagement. Identify early adopters from utility and industry to participate in customer centric PoC/trial.
- iv. Encourage innovation that leverages IoT networks to service multiple utility application and to create new applications/services for consumers to better manage their utility.

7.5 Transport

- i. Aggressively pursue State and Local Government funding for new models of transport, including Mobility as a Service, autonomous vehicles and EV charging stations as well as investigate the land-use and behavioural implications that new business models will have on the future of our communities.
- ii. Discuss & prioritise key IoT opportunity areas in transport that offer big economic impacts, drawing on international references for example, Ipswich, Singapore, London and Stockholm.

8. BEST PRACTICE IN IOT FOR SMART CITIES

This section briefly highlights the use case and the work of globally connected and future thinking government leaders and city managers in applying best practice in the areas of Smart Cities & IoT.

8.1 Singapore

In October 2014, the Singaporean Government has created the *Infocomm Development Authority* (IDA) who is "setting the stage for Singapore to be the World's First Smart Nation that functions beyond the capabilities of a Smart City."² The *IDA Smart Nation Platform* (SNP) is a key IoT network infrastructure initiative to support IoT enabled innovation that will leverage their *Block 71* start-up community program.

<https://www.greenbiz.com/article/singapore-aims-become-worlds-first-smart-city-state>

8.2 UK Government – Innovate UK & Hypercat

In March 2014 the UK Government announced a significant increase in Government funding for IoT projects, citing their potential to underpin a new 'industrial revolution'. In addition, the Government continues to fund the targeted development of IoT technologies and pilot studies through *InnovateUK*.

As a specific example, the UK Government also earmarked £73 million for IoT projects in 2015. Initiatives include *Hypercat*, a streamlined IoT interoperability profile driven by the *UK Technology Strategy Board* to better open and share data across portfolios.

HyperCat is an UK based ecosystem focused on breaking down silos to deliver interoperability in the Internet of Things. The HyperCat specification is open and freely available, and supported by an increasing number of vendors. (<http://www.hypercat.io/>)

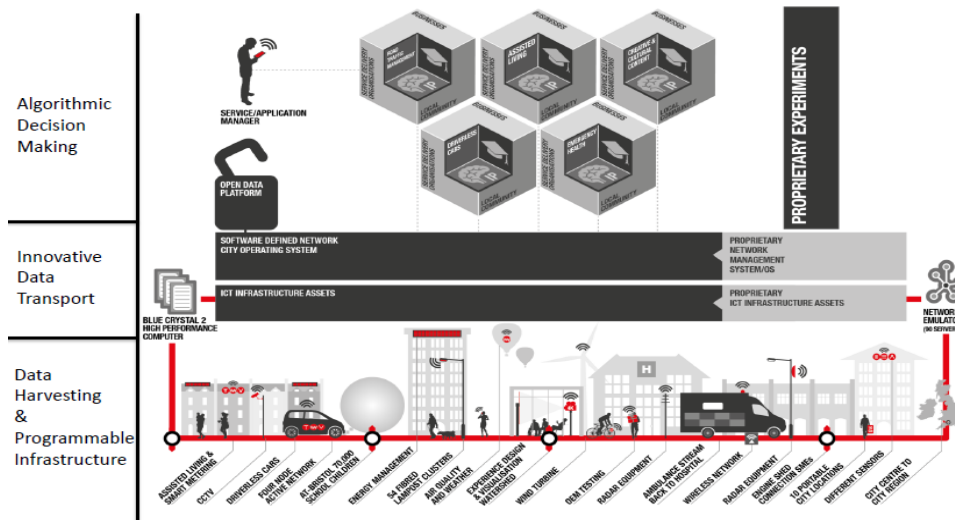
Supported by the UK Government under the key innovation body, Innovate UK, HyperCat has already built up real traction, with over 800 members including leading technology players, SMEs and public sector organisations. HyperCat is addressing two central challenges around the rapidly evolving Internet of Things. Firstly, how to find relevant and trustworthy data from connected "things"; and secondly, how to make it easier for those things to talk to each other.

8.3 Bristol – an Open Programmable City

'Bristol Is Open' is a joint venture between the University of Bristol and Bristol City Council and is using data sensors and smart city technologies in order to better manage and respond in real-time to its daily operations of the city across traffic congestion, waste and energy management. These networks are controlled in a Software Defined Network that is based on the OpenFlow standard.

² <https://www.ida.gov.sg/about-us/>

City Experimentation as a Service



<http://www.bristolisopen.com/>

8.4 Amsterdam - Public Access IoT Networks

In a world first, the City of Amsterdam has deployed a crowd sourced public access IoT network based on the open standard technology, LoRaWAN™ by The Things Network (thethingsnetwork.org). Within a period of 4 weeks in November 2015, a city-wide smart sensor network was deployed across Amsterdam that was crowd sourced and implemented “by the people for the people.”

From day one, a variety of compelling use cases were built on top of this low power, long range, open standards network. Six months later, the smart cities and asset management innovation platform now supports dozens of community and business applications for smart sensor devices, including monitoring rainwater levels in boats across the many neighbourhood canals; helping people access shared solar power via the WeShareSolar app; monitoring the location and safety of bicycles across the city; and assisting the Port of Amsterdam to provide real time management information about watercraft movements to the broader maritime community. (<http://thethingsnetwork.org/c/amsterdam>)

Public access IoT networks are now being deployed in Australia by Meshed IoT Integrators. The University of Wollongong (UoW) with the support of the City of Wollongong, Meshed and Sydney Water has launched the Wollongong Digital Living Lab initiative which will see the entire city of Wollongong covered by a free to air IoT network using The Things Network. The network will support applications for wheelchair accessibility, building management, storm water management and environmental monitoring. (<http://www.iothub.com.au/news/meshed-launches-public-lorawan-network-in-wollongong-418609>)

The Cities of Ipswich and Sunshine Coast in QLD as well as the Shire of Southern Grampians in Victoria have also deployed public access IoT networks in partnership with Meshed and The Things Network.

8.5 Smart Precincts

Hudson Yard – The fully engineered city for New York

"Hudson Yards will be the nation's first 'quantified community,' a testing ground for applied urban data science."

Over the next decade, this \$20-billion project will transform the old Hudson rail yard precincts between 30th to 34th Streets and 10th and 12th Avenues and will add 17 million square feet of commercial, residential, and civic space. The precinct will be fully instrumented to support leading urban design and green living principles specifically, on-site, cogeneration plant; energy management systems that calibrate use across the grid and smart meters, thermal exchange heat and chilled water systems and Envac pneumatic-tube trash removal systems for recyclables, trash and food waste.

(<http://content.related.com/HYImages/2015-07/Engineered-City-Hi-Res.pdf>)

8.6 Smart Water Management

Leaky pipes are a huge cost and waste of valuable water resources. Barcelona saved \$58 million in one year;

Here in Australia, Townsville has implemented a smart water pilot that is breaking new ground in the way data is collected and analysed in near real-time. At its core, it will help identify and enable ways for the people of Townsville to drive water conservation by empowering residents with smart technology to assist with positive behavioural change. By using smart sensor networks Townsville City Council is able to deliver near real-time information about daily water usage from digital water meters to the Council and residents via a web portal and reduce overall consumption as well as offset future infrastructure investment. The results of the pilot showed:

- 50% of consumers changed their behavior after seeing both timely data and insight from their pattern of use on the portal.
- 98% faster notification time on water leaks, from three months to day, potentially saving millions of litres of water, associated treatment and delivery costs, reduction in bill shocks and complaints to the call center.
- 10% reduction achieved in overall average household water consumption by residents accessing the portal.

(<http://www-03.ibm.com/press/au/en/pressrelease/40800.wss>)

8.7 Smart Street Lighting

More than 2,000 cities are currently deploying smart city applications using LED lights. Cities such as Nice, France are already implementing smart lighting, which monitors lamp intensity and traffic sensors to reduce car theft, assaults, and even home burglary. These lighting initiatives are also expected to reduce the city's energy bill by more than \$8 million.

The City of Sydney replaced 6,450 conventional lights and has saved nearly \$800,000 a year in electricity bills and maintenance costs.

(<http://www.cityofsydney.nsw.gov.au/vision/towards-2030/sustainability/carbon-reduction/led-lighting-project>)

8.8 Smart Buildings

Buildings account for around 75% of total electricity usage globally and an estimated one third of that energy is wasted. When infrastructure becomes smart – with networked sensors – the efficiency of a building can be greatly improved.

Bueno Systems in Australia have deployed analytics on the BMS and utility meters at a major shopping centre in Victoria. The center is ~88,000m² with 4 stages of development. The building has a NABERS Energy rating of 3.0 Stars, however the site has always been considered anecdotally to be one of the poorer performing sites in the FM's portfolio.

The pilot began in September 2013 and over the first twelve months of operation the energy consumption of the site has reduced by 356,000 kWh of electricity and 70 GJ of gas with an equivalent cost saving of \$54,000. These energy savings have been delivered despite the cooling load being 25% higher in the year to date.
(<http://www.buenosystems.com.au/publications/>)

8.9 Smart Bins & Waste Management

Smart bins are designed with smart sensors that track contents of a bin to avoid unnecessary collection when there is no waste & monitoring of illegal waste dumping. Big Belly, an Australian Solar Bin company has installed fast compacting street rubbish bins in the Melbourne CBD, Yarraville as well as the city of Salzburg with the results being weekly collections reduced from 4 times per day to once every second day, significant fuel savings and GhG emissions, labor productivity gains and quality of life improved with public space beautification.
(<https://www.solarbins.com.au/features/big-belly-solar-bin/>)

8.10 Smart Parking

Smart Parking uses IoT to provide real time information on parking with smart phone apps and traffic signs to guide drivers to an available parking space using route optimization. The benefits are reduced congestion and optimization of utilisation of car parking spaces.

A trial of Smart Parking in San Francisco found that Smart Parking reduced the amount of time spent searching for a space by 43 per cent. The city of Nice in France deployed smart parking across 8,500 on-street spaces and 19 multi-storey parking structures in 2013. The results have shown reduced operational parking costs by 30 per cent, a 24 month return on investment and reduced congestion and pollution by 10 per cent.

<http://www.intel.com/content/www/us/en/internet-of-things/videos/iot-and-siemens-smartpark-video.html>

8.11 Smart Energy

Energy grids are now under the intense operational pressure with the addition of intermittent renewable resources (such as wind), the increase of distributed generation and the pending retirement of aging fossil-fuel plants as well as new competitive pressures on the industry resulting from new IoT products and locally generated energy in the market place.

Hence, the smart grid is rapidly gaining traction with utilities around the world as a source of improved operational efficiencies and greater reliability.

In Texas, Oncor, the largest regulated transmission and distribution service provider has deployed a smart meter solution. The solution collects data and operational process messages at fifteen minute intervals from meters throughout the electric grid. Oncor gains greater visibility into power demand and service quality so it can pinpoint service problems and minimise service disruptions. Oncor's smart metering system allows energy consumers to make informed decisions about their electricity usage, minimising energy costs. Ultimately the system provides Oncor with the

information it needs to better manage the distribution network down to the meter. The results were that consumers become active participants in their power consumption management with an estimated 5-10% reduction in household electrical consumption.

<http://data-informed.com/texas-utility-oncor-launches-smart-grid-project-with-ibm/>

Smart grids and sensor networks have also been trialled in Australia, one of the most notable being the "Smart Grid, Smart City" project, led by Ausgrid (formerly known as Energy Australia). Ausgrid is a state-owned, electricity infrastructure company that owns, maintains, and operates the electrical distribution network to 1.6 million customers in New South Wales. Leading the "Smart Grid, Smart City" project, Ausgrid has set the goal of trialling smart meters in both city and regional locations with the aim of reducing reduced capital and operating costs for substations and infrastructure as well as better visibility into household and industry demand.

<http://www.industry.gov.au/ENERGY/PROGRAMMES/SMARTGRIDSMARTCITY/Pages/default.aspx>

8.12 Autonomous Vehicles

The potential of autonomous vehicles to boost the Australian economy and reimagine mobility is unmatched. McKinsey assessments suggest that fully autonomous vehicles could eliminate 90 per cent of motor vehicle accidents, with partially autonomous vehicles eliminating around 40 per cent of accidents.

In the NSW context, the hypothetical elimination of 90 per cent of accidents that occurred between 2008 and 2013 on regional local roads is equivalent to around 1,330 less fatalities and 90,300 less injuries over a six-year period. In addition, the total economic cost of fatalities and injuries on local roads over the same period would have reduced by \$13.5 billion¹⁹.

The Cooperative Intelligent Transport System Initiative (CITI) pilot has constructed a 42 km connected freight corridor test facility in the Illawarra Region of NSW south of Sydney and is one of the first large scale test facility dedicated to Heavy Vehicles in the world.

In 2015, The South Australian Government introduced laws allowing the on-road testing of autonomous vehicles, positioning the state to be at forefront of the future Australian autonomous vehicle industry, with the expectation that driverless cars will be made possible by about 2025. The trial is a partnership by the Australian Driverless Vehicle Initiative with Volvo and Codha wireless who have undertaken Australia's first on-road demonstration of an autonomous vehicle.

In 2015, the United Kingdom Government provided \$19 million to fund four autonomous vehicle trials across Britain located in Greenwich, Bristol, Milton Keynes and Coventry. These cities were selected following a 'driverless cars' competition that invited UK cities to partner with business and research organisations to undertake local autonomous vehicle trials. This investment is significant, as the UK Government predicts the autonomous vehicle industry will be worth more than \$900 billion by 2025. The trials being undertaken in the UK have been actively facilitated by government funding to support trials of autonomous vehicles on public roads, and by developing a comprehensive strategy to offer a welcoming regulatory framework that aims to encourage and facilitate the testing and production of autonomous vehicles by cities and vehicle manufacturers.

8.13 Flood Management

Flood Network from the UK is offering people the opportunity to purchase their own flood sensors and to report the data onto their Flood Map. This initiative was motivated by the catastrophic floods of December 2015 caused by Storms Desmond, Eva and Frank, which resulted in a £1.3bn insurance bill. Using crowd-sourcing and partnering with The Things Network, the Flood Network is providing real-time flood flow and level information. (<http://flood.network/>)