

Technological Innovation in Local Government

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## **1. Abstract**

This paper sets out an argument for local governments in the State of Victoria, Australia, to encourage and foster more innovation for the benefit of their local communities. The paper covers the basic drivers and barriers to innovation in the public service and in the unique context of a local government authority. The paper then examines how local governments across Canada and the United States of America have successfully developed innovations using technology and considers what lessons these experiences provide for local governments in Victoria.

*Keywords:* technological innovation, local government, community benefit, change management, technology, municipality, engineering, construction, and organisational culture.

## **2. Technological Innovation in Local Government**

Local government is the most accessible level of government for most communities. It has a broad remit and is entrusted with providing local services and infrastructure to support the wellbeing and quality of life of its citizens. Improvements to how local government operates and its effectiveness have considerable potential to benefit local communities. This paper outlines the potential for technological led innovation to help improve outcomes for the communities which local governments serve.

### **3. Literature Review**

#### **3.1 What is Innovation?**

Innovation is commonly viewed as being a nebulous and difficult to define term. In their influential 2003 discussion paper, Geoff Mulgan and David Albury, of the Prime Minister of the United Kingdom's Strategy Unit, succinctly define innovation as 'new ideas that work' (Mulgan & Albury, 2003). Innovation can be a change to a process, system or structure. It can be a new service or product or even be the cessation of an existing service or the removal of a product from the offering. At its most fundamental level, innovation is making a change to the *status quo* for the better (Mulgan & Albury, 2003).

Mulgan & Albury categorise innovations as either systemic or transformative, with systemic being incremental improvements, whereas transformative are major disruptions to current practice (Mulgan & Albury, 2003). All innovations no matter their size and complexity, involve changing systems and processes and influencing the people involved to do something differently (Johnson, 2010).

#### **3.2 Why Innovate?**

The drivers for innovation differ significantly between the private and public sectors (Borins, 2001).

In a free market, capitalist environment, innovation is often a company's response to the existential threat faced by competition from other market actors, both incumbents and potential entrants. Without innovation, incumbents face the risk of competitors creating a more compelling offering thus luring their customers away and threatening their ongoing commercial viability.

The motivations to innovate in the public sector are much less clear and acute than in the private sector. Public sector entities often operate as monopoly or sheltered service providers or

provide services that would not be viable in a commercial environment, and therefore are not exposed to competitive market pressure (Borins, 2001).

There are two broad categories of motivators for innovation in the public sector: policy settings, and the desire to maintain social license or credibility with stakeholders and the community (Martin, 2001; Mulgan & Albury, 2003). Importantly, these two drivers are not mutually exclusive.

At a fundamental level, a political mandate or desire for an outcome from the elected officials governing a public service compels the bureaucracy to respond. Ambitious or novel policy settings can and should drive an innovative response. A good example of this is in the City of Vancouver, Canada, where political imperatives called for greater engagement of the local community in the allocation of resources to address chronic social and health issues (United Nations, 2005). In response to the call for greater involvement of the community from the elected officials, the administration of the City of Vancouver created and implemented an extensive participatory democratic process with the administrative decision making on budget allocations, social welfare programs, and other services devolved to local communities. The catalyst for this innovative change was the political expectation, and therefore policy directive, of the elected officials that the City of Vancouver engage with the local community more meaningfully (Bertucci, 2005).

The other key driver for innovation in the public sector is to maintain credibility and trust with the local community and stakeholders (Martin, 2001; Mulgan & Albury, 2003). The implicit social license under which democratic government operates is that the population surrender some of their personal freedoms and liberties in exchange for the benefits of acting collectively. This implied contract breaks down when either party fails to meet the expectations of the other. In this



environment, there is a discrete motivator on the public sector to proactively innovate in ways that continue to meet the expectations of the community. Recent examples of this phenomenon in Australia include innovations in customer service delivery (Borins, 2001). Many government agencies across Australia have invested heavily in digitising services and providing additional customer contact channels. The drivers to make it easier and more convenient for customers to interact with government are not often explicitly motivated by political mandates or imperatives. The core drivers for many of these investments are to ensure customer service delivery is contemporaneous with the standards set by other non-governmental service providers (Nili, Barros, & Tate, 2019). The intent of such innovations is to ensure that customers' innate expectations are met when interacting with government agencies, thus helping to build trust and credibility.

An ever-present challenge for all organisations is to maintain prudent financial management of their resources. Innovations can help to identify more efficient and cost-effective ways to deliver services and therefore are a key tool in ensuring responsible expenditure of funds. Whilst financial sustainability is arguably less of an immediate concern for most public bodies given their ability to effectively raise revenue relatively unencumbered, it is key to the perceptions of government efficiency and value. Reports by the Commonwealth of Australia and State of South Australia's productivity commissions have both examined the financial efficiency of local governments across Australia, and conclude that measuring and improving productivity and financial efficiency is a key challenge for local governments (Australian Productivity Commission, 2017; South Australian Productivity Commission, 2019). As can be seen from the work of Mulgan and Albury, innovation has been highly successful at identifying and dealing with inefficiencies in the public sector in the United Kingdom (Mulgan & Albury, 2003), and is arguably a key tool that

needs to be unleashed in local government in Australia to improve productivity and financial efficiency.

### **3.2.1 Wicked Problems**

There are particular challenges faced by governments that are intractable and immensely difficult to confront, known colloquially as ‘wicked’ problems (Head, 2008). Wicked problems include things such a climate change, rapidly increasing population density, and entrenched social disadvantage. Wicked problems are often defined by how they are not solved. They are not solved using known methods and previously successful approaches. The nature of these challenges means that novel and innovative approaches are not only helpful, but arguably necessary to address them successfully (Zhang & Kim, 2016).

### **3.3 Traditional Barriers to Innovation in the Public Service & Local Government**

Mulgan and Albury identify eight barriers to innovation in the general public service. These include a culture of risk aversion, delivery pressures, short-termism, lack of change and risk management skills, lack of incentives, unsupportive cultures, over-reliance on high performers, and unconstructive approaches to failure (Mulgan & Albury, 2003).

Similarly to Mulgan and Albury, the United Nations identifies that there are four types of barriers to innovation that are unique to the public sector, including cultures of risk aversion, ad hocism, delivery pressures and administrative burdens, and a lack of incentives (Bertucci, 2005).

A common finding in studies into innovation in the public sector is that risk aversion and a fear of failure prevent incremental improvement via experimentation and trial and error (Bekkers, Tummers, & Voorberg, 2013; Martin, 2001; Mulgan & Albury, 2003; United Nations, 2005). Studies suggest that government organisations with strongly risk adverse and conservative cultures discourage innovation of others with which they wish to partner with, as well as within their local

communities (Bekkers et al., 2013). A study by Uyarra et al found that over-specification and burdensome and unequal risk allocation without reasonable opportunities for mitigation severely curtail the ability to produce innovative outcomes in government procurement (Uyarra, Edler, Garcia-Estevez, Georghiou, & Yeow, 2014).

Local government differs in small but meaningful ways from other levels of government, government services, and the general public service. Local government is the level of government that has the closest connection with its constituents and is most accessible to the community (Australian Productivity Commission, 2017). In stark contrast to many other government agencies, most local government authorities have diverse, varied, and constantly evolving service offerings (Leach & Davis, 1996; Martin, 2001; South Australian Productivity Commission, 2019). The breadth of individual local government's service offerings, the decentralised nature of local governments, a lack of consistency in reporting, and benchmarking in service delivery often coalesce to curtail innovation in the local government sector (Martin, 2001). In the Australian context, the lack of widespread and successful innovation in local government is a contributor to lower levels of productivity and, importantly, lower levels of community trust and sentiment (Australian Productivity Commission, 2017; Coelli, 2019; Woodbury & Dollery, 2004).

The challenges faced by local government in innovating are particularly worrisome given that local government is likely to be most often compelled to innovate through policy changes and the need to maintain the trust of their local community to whom they are most accessible.

### **3.4 The Opportunities for Technology Led Innovation**

As Mulgan and Albury identify, technology is a powerful enabler for innovation that enables rapid prototyping and iteration and cost-effective scalability (Mulgan & Albury, 2003). The rapid evolution of enabling technologies such as cloud computing (Avram, 2014), low cost

environmental sensors (Hancke & Hancke Jr, 2013) and data analytics tools (Arribas-Bel, 2014), workforce demographic shifts, and the resulting cultural changes mean the opportunities to innovate using technology are plentiful.

Studies optimistically suggest that that the greater adoption and use of technology solutions has a particularly powerful potential to help governments and their communities deal with intractable, wicked problems such as traffic congestion and the environmental impacts of urbanisation through innovation (Mulgan & Albury, 2003; Zhang & Kim, 2016).

The key enabler that technology provides is the ability to innovate at a scale or in an environment where experimentation and failure are more acceptable. Arguably, technology can help address the core barriers to innovation in the public sector, risk aversion, and an unconstructive approach to failure (Mulgan & Albury, 2003; United Nations, 2005). For example, the modelling of traffic congestion using computer simulation can enable various potential technical solutions to be trialed and the community meaningfully engaged before large scale investment is committed. The use of technology in this example can enable innovative approaches to be trialed in an environment with a greater acceptance for failure (Zhang & Kim, 2016).

#### **4. Observations of Technological Innovation in Local Government in North America**

The author visited numerous cities and localities across North America and interviewed staff and industry figures to assess innovative practices, the use of technology in innovation and the cultures and support structures present within organisations that supported innovation.

The author also visited the 2019 American Public Works Association (APWA) annual public works conference, PWX, in Seattle. The conference brought together city officials, organisations, companies, and researchers and provided an opportunity to learn about innovations and approaches in governments from across North America. The conference included presentations on management, public engagement, and technical topics such as engineering and design, construction, plant and equipment, and innovative technologies such as machine learning, and advanced asset management systems.

##### **4.1 Local Government in Australia, The United Kingdom and North America**

The remit of local government in Canada and the United States of America is generally much broader than that in Australia. The model for local government in Australia varies, with some states taking some more closely aligning with the North American approach whilst others having a more United Kingdom approach. Local government in the Australian state of Victoria is particularly similar to that in the United Kingdom wherein many of the services provided at a municipal level in North America, fire, policing, education, etc. are provided at state level not locally (Wilson & Game, 2011). In Victoria and most of the United Kingdom, local government is responsible for providing direct services to communities such as early childhood education, childcare, assistance to those who are elderly, socially isolated, or have health and medical needs at home, managing amenity issues such as parking restrictions, pet registrations, administering local laws, and providing statutory functions around local urban planning and development

approvals. Additionally, local government in Victoria and the United Kingdom is responsible for the care and management of local assets such as local roads, stormwater drainage systems, parks and play spaces, community centres, small scale sporting facilities, etc. In North America, local government authorities are often responsible for the provision of large water supply and wastewater services, and emergency services such as police and fire departments. Many local government authorities in North America also have responsibilities for large scale infrastructure such as mass transit systems.

Despite the different roles of local government, the value of asset portfolios relative to their population size is counterintuitive. The City of Vancouver, in British Columbia in Canada, reported an asset portfolio in the fiscal year of 2018 of approximately \$7.1 billion Canadian dollars with a population of 672,963 people, or approximately \$12,000 Australian dollars of assets per person (City of Vancouver, 2018a). This contrasts with the urban municipality of The City of Port Phillip in Melbourne, Victoria, Australia with an asset portfolio reported in the fiscal year of 2018 of approximately \$3.2 billion Australian dollars with a population of approximately 111,000 people, equating to \$28,000 Australian dollars of assets per person (City of Port Phillip, 2018) and the rural municipality of Colac-Otway Shire with a figure of approximately \$14,000 of assets per person (Colac-Otway Shire Council, 2018).

The difference in the role of local governments across different countries is also reflected in staff complement relative to their populations. North American cities generally have much larger employment cohorts than Australia local governments, with some small municipalities in the states of Illinois and Massachusetts in the United States of America, such as the Village of Oak Park and the Town of Wakefield, having one staff member per 14 and 20 residents respectively (The Village of Oak Park, 2018; Town of Wakefield, 2018). Larger North American cities, such as Boston in

Massachusetts, Portland in Oregon, and Vancouver in British Columbia, have one employee per 96, 66, and 37 residents respectively (City of Boston, 2018b; City of Portland, 2018; City of Vancouver, 2018a).

The above differences in the roles and scales of the local governments across North America compared to Victoria are an important consideration when taking into account their respective approaches and successes with innovation.

#### **4.2 General Observations**

The use of technology to lead innovative approaches to challenges faced by local governments and their communities was very common across the North American local governments studied. The sophistication of the technology used was highly variable. As to be expected, larger local governments with greater financial means often made use of more advanced technology, such as remotely monitored environmental sensors, autonomous vehicles and machine learning data analysis tools, whereas smaller, less well-equipped local governments made use of more established technology such as integrated asset management platforms, and geographic information system (GIS) applications.

A consistent observation was that the cultures of many of the North American local governments studied supported innovative practices, critical thinking, and experimentation through trial and error. This was prevalent in both large and small organisations regardless of their financial means.

#### **4.3 City of Vancouver - North-East False Creek Redevelopment**

The City of Vancouver, the local government in Vancouver, Canada, is a leader in innovation in the public sector, having been recognised by the United Nations and many other organisations for its approach to innovation (Brunet-Jailly, 2008; United Nations, 2005).

Vancouver is a successful, thriving urban metropolis on the west coast of Canada in the province of British Columbia. The City of Vancouver regularly ranks towards the top of livability and quality of life indices. Like many large cities across the world, Vancouver faces numerous challenges associated with urbanisation, increasing population density and social disadvantage (City of Vancouver, 2018b). Successive waves of elected officials to the City of Vancouver's local government have committed to maintaining the enviable quality of life in the City of Vancouver whilst seeking to address these issues through a variety of social welfare programs and programs of infrastructure investment.

The North-East False Creek Redevelopment is a highly complex technical infrastructure and urban renewal project and has required innovative approaches to dealing with entrenched social disadvantage and segregation in an area south-east of the centre of Vancouver. The project involves the demolition of a number of roadway viaducts, the creation of a network of public open space, and the opening up of large areas of land for housing and commercial development (City of Vancouver, 2018b). The project is innovative in several ways, from the financing which will involve the future development opportunities advance-funding the infrastructure construction, to the way the City of Vancouver has engaged with the community on the planning and visioning for the project. The project is also highly technically innovative from a traffic engineering perspective where dedicated viaducts will be removed for the movement of traffic and replaced with at grade, integrated shared traffic corridors that combined vehicle, cyclist, and pedestrian movements. The project involves many technical challenges, such as major utility diversions, implementing neighborhood energy systems, extensive stormwater harvesting and pollutant removal systems, providing utilities for public activation such as events and onsite filming, management of extensive



soil contamination, and other construction constraints that are common in inner city urban environments across the world (City of Vancouver, 2018b).



*Figure 1 – Example of bicycle infrastructure in downtown Vancouver (Lachlan Johnson)*

The City of Vancouver’s delivery approach involves an in-house team of engineering, urban planning, and sustainability professionals delivering the vast majority of the project, with third-party entities managing the electricity and telecommunications infrastructure (City of Vancouver, 2018b). This novel approach differs to that often taken by other local governments, wherein most technical expertise to deliver such a large project would often be sought from external providers, such as multidisciplinary professional service firms or through partnership with delivery agencies of the local state or province.

The City of Vancouver has a high degree of technical and engineering expertise in-house (Brunet-Jailly, 2008; Punter, 2010). The City of Vancouver employs over 200 professional engineers and invests heavily in maintaining a highly capable workforce through professional development, accreditation of engineers and graduate rotation programs (City of Vancouver, 2017a, 2017b, 2018a, 2019a, 2019b; Punter, 2010). A large and capable in-house engineering and asset management workforce was also observed at the neighbouring municipality in the District of West

Vancouver. This smaller municipality faces different challenges to the City, however, has sophisticated connections between their financial forecasts and their asset management practices, helping to address financial issues (District of West Vancouver, 2018).

Interviews and discussions with engineering staff from The City of Vancouver provided anecdotal evidence of the City of Vancouver's investment in the engineering and technical skills of its workforce and provided a snapshot of the culture that exists within the organisation. Staff provided examples of the extensive graduate training programs provided by the City of Vancouver, supported by professional development investment, field trips, job rotations, and a continual focus on the betterment of the engineering profession (M. Pate, personal communication, September 4, 2019). For example, during interviews with the author, staff gave examples of the approval process required for engineering designs with formalised 'sign-off' only able to be provided by appropriately accredited engineers. This practice is supported by the overall engineering regulatory environment in British Columbia governed by the Engineers & Geoscientists Act ("Engineers and Geoscientists Act," 1996) and standards governing the use of an Engineering Seal ("Quality Management Guidelines - Use Of Seal," 2017).

Interviews with City of Vancouver staff also provided an insight into the organisation's approach to failure which, as Mulgan & Albury identify, is often a major barrier to the public sector embracing innovation (Mulgan & Albury, 2003). Staff spoke of an incident from many years ago where a major sewer reconstruction project encountered significant unforeseen challenges during a delicate stage of construction. The resulting issues caused major traffic disruptions in the downtown area and were covered extensively in the local media. Staff spoke of the organisation's response as being constructive, in that the organisation's leadership sought to professionalise project management at the City of Vancouver through the establishment of a project management

office and the application of project management methodologies in the delivery of future projects (M. Pate, personal communication, September 4, 2019).

Complementing its considerable technical expertise, The City of Vancouver also has a large generalist continuous improvement program wherein they equip staff across all areas of the organisation to use tools, such as six-sigma, to innovate on a small scale to reduce waste and improve efficiency. Through this program, The City of Vancouver has established a cohort of hundreds of staff trained with continuous improvement skills who are imbedded in the service delivery areas of the organisation (City of Vancouver, 2019b). This disaggregated approach, is an example of a successful approach to managing the risk of becoming overly reliant upon high performing individuals for innovation (Mulgan & Albury, 2003). The City of Vancouver's approach is to create and sustain a broad workforce with the skills to drive innovation.

It is posited that the innovations exemplified in the North East False Creek project are enabled because of the in-house expertise that the City of Vancouver maintains. This aligns with the insights of Uyarra et al around the difficulties in seeking to outsource innovation (Uyarra et al., 2014). By having a high degree of in-house, professional expertise and understanding, the City of Vancouver is able to take technical risks in an informed manner, helping to avoid the innovation pit fall of risk aversion (Mulgan & Albury, 2003; United Nations, 2005).

The City of Vancouver and the North East False Creek project provide a great example of how a public sector organisation can build, sustain, and apply innovative thinking. The City of Vancouver has established a culture that supports prudent risk taking, values and encourages innovation and is constructive in its response to failure through its investment in its people and their skills.

#### 4.4 City of Portland – Traffic Safety Sensor Project and Sidewalk Labs

The City of Portland is the largest city in the US state of Oregon. The city is renowned for its progressive culture and highly innovative practices (Harmon, Castro-Leon, & Bhide, 2015; Pellicer et al., 2013). Portland is particularly well known for its approach to prioritising transport by bicycle over other forms of personal transportation (Gotschi, 2011).



*Figure 2 – Bicycle crossing line marking, Portland Oregon (Lachlan Johnson)*

Unfortunately, the City of Portland has persistently high statistics in the number of road traffic accidents resulting in serious injuries and fatalities (Oregon Department of Transportation, 2020). In 2018, the City of Portland embarked on a program to use traffic sensors to collect data to help inform future infrastructure investment decisions, the aim being to use data to better target changes to the road network that would make it safer for all road users (City of Portland, 2019a). The traffic sensor project was part of the City of Portland’s Smart City PDX program (Condon, 2018). The project involved installing approximately 200 sensors on streetlights along three main

roads in Portland: Southeast Division Street, Hawthorne Boulevard, and 122<sup>nd</sup> Street. These three streets corresponded to the locations of the greatest number of serious accidents in the City of Portland (City of Portland, 2019c; Oregon Department of Transportation, 2020). The sensors were an integrated unit that collected data from wireless frequencies such as the commonly used consumer bands like Wi-Fi and Bluetooth and through visual recognition from cameras mounted on the sensors. The proprietary product was manufactured by General Electric Inc (GE) and had previously been rolled out across the Californian city of San Diego (Perry, 2018). The total project had a budget of approximately \$1,000,000 US dollars, or approximately \$1,577,573 AUD (City of Portland, 2019b).



*Figure 3 - Traffic Safety Sensor (Lachlan Johnson)*

According to statements made at the time, the installation of the smart traffic sensors had the potential to revolutionise the City of Vancouver's approach to traffic management and potentially save lives (Condon, 2018). Despite the admirable aims of the project, there was concern about the collection and use of such data, particularly around the capturing of high definition video that could be used to identify individuals. These concerns were acknowledged at a public event

when the City of Portland's Mayor, Ted Wheeler, was quoted at an event launching the project that there was a risk that 'technology happens to us rather than working for us' (Condon, 2018). The Mayor was also quoted as saying that privacy concerns with the project were 'well-addressed' (Condon, 2018).

During interviews with the City's staff involved in the project, they spoke of difficulties in managing the issues around the new technology, including setting the system up, managing and processing the data for use in making decisions, and importantly, addressing concerns around privacy (A. Hill, personal communication, September 6, 2019).

The project was highly innovative in that technology that had not previously been used by the City of Portland was being rolled out on the three main roads. The City of Portland's staff faced numerous challenges with adapting the technology to their local setting from configuring the devices to upgrading infrastructure to enable them to be mounted safely. Once implemented, the City of Portland's staff faced the challenge of managing the volume of data created by the sensors and turning this data into discernable information that could be used for decision making. This is a common challenge with new technologies such as environmental sensors and the Internet of Things (IoT) (Chen, 2012; Uckelmann, Harrison, & Michahelles, 2011).

The largest challenge that the City of Portland had with the program was to ensure that its implementation protected the privacy of members of the public. When interviewed, the City's staff spoke of the difficulties they faced with balancing the potential of the sensor system with the concerns of citizens that, if implemented inappropriately, the technology could erode fundamental human rights of people living in the city (A. Hill, personal communication, September 6, 2019). Concerns around new technology and privacy are not uncommon, however, concerns around the government's collection of data through new technology is a particularly vexed issue in the United

States of America (Cullen, 2016; Gandy Jr & Nemorin, 2020; Zureik, Stalker, & Smith, 2010). The City of Portland engaged heavily with the community on the principles that should govern the City of Portland's use of such technology (City of Portland, 2019d). Staff spoke of the tension that constantly existed in the project to realise the full potential of the sensors, thus improving safety for road users and the need to ensure that the large and valid privacy concerns of the public were addressed (A. Hill, personal communication, September 6, 2019). The staff spoke of the many tests, redesigns, feedback and engagement sessions, complex legal and philosophical deliberations, and involvement of various other parties in the continuing effort to balance the two elements of the project.

Ultimately, a technical solution was found that helped to address privacy concerns and ensure that the sensor deployment could achieve the desired outcomes. The City of Portland and its partners worked to have images and video processes onboard the sensors before it was transmitted to a central repository for storage and eventual analysis. This enabled the sensors to still use their high-definition visual recognition and machine learning capabilities to identify different users of the road but did not retain the raw data, meaning that highly valuable, de-identified data was the only output from the sensors (City of Portland, 2019c)

In early 2019, the City commenced a new initiative to have evidence and data at the heart of their decision making and investment choices. The City of Portland decided to partner with the Alphabet company, Sidewalk Labs, to use their controversial Replica software (Gandy Jr & Nemorin, 2020; GeekWire, 2019) The Replica platform uses the large data sets from the Google ecosystem and other sources to create a virtual data model of the city (TechRepublic) This data is collected from a variety of sources including peoples' smartphones. The company states that this raw data is used to create anonymous, de-identified 'synthetic data' that gives city planners a data

set that is very similar, but not the same, as what occurs in their city (GeekWire, 2019; Sidewalk Labs, 2020). During interviews with City of Portland staff, they spoke to the potential of how the synthetic data set could clearly identify which side of a residential street a footpath using more heavily or if there was a barking dog at a property because less people would be likely to walk past the property (M. Kerr, personal communication, September 6, 2019)

Based on interviews, the City of Portland staff have taken the learnings from their experience with rolling out the traffic sensor project and applied them to their new partnership with Sidewalk Labs in the use of the Replica platform (M. Kerr, personal communication, September 6, 2019) (A. Hill, personal communication, September 6, 2019). City staff spoke of genuine and deep community engagement on the partnership with Sidewalk Labs and the need for privacy considerations to be fundamental when considering the use of the platform. This has had practical implications such as insisting upon third-party audits and verification of data to ensure anonymity. Interviews with staff indicated that this proactive approach to addressing privacy concerns has seen a significant shift in the community's support for the collection and use of big data such as through the Replica platform to help the City of Portland address its challenges (A. Hill, personal communication, September 6, 2019).

The example of The City of Portland's experience with their traffic sensor roll-out demonstrates a highly mature response to the challenges they faced. As Mulgan and Avery identify, many public sector organisations have highly immature and unhelpful approaches to such challenges and/or failures and that these responses curtail future innovations (Mulgan & Albury, 2003). The City of Portland's approach demonstrates the antithesis of this approach. They took their experiences and the difficult lessons learnt during the roll-out of the traffic sensors and applied them to the next, larger, and arguably more innovative project. This provides a small



insight into the culture at the City of Portland and salient point for other organisations to consider when they respond to challenges and failures.

#### **4.5 City of Oregon City – Geographic Information System**

The City of Oregon City is a peri-urban municipality in Oregon. The City of Oregon City provides an interesting example of how technological innovation is enabled through engagement with staff, patience, persistence, setting aside short-term needs to focus on longer-term outcomes, and the importance of change management.

The City of Oregon City is a peri-urban municipality located to the south of the State's largest city, Portland. In the 2018 fiscal year, The City of Oregon City was home to 34,860 people, employed 206 staff, had an annual budget of \$69,556,298 (AUD), and reported a total asset value of \$180,156,864 Australian dollars (City of Oregon City, 2018). Furthermore, The City of Oregon City held approximately \$5,168 Australian dollars of assets per resident, which was considerably less than the adjacent and larger City of Portland, which employed nearly 10,000 staff, had an operating budget of \$2,379,493,254 (AUD), and held \$15,360 Australian dollars of assets per resident (City of Portland, 2018).

While the City of Oregon City has considerably restricted financial resources, it has been highly innovative. The City of Oregon City has established a highly successful geographic information system (GIS) linked to its asset management platform and has used the system to drive greater engagement with the community and much improved asset management practices. Whilst an integrated GIS and asset management system is not necessarily considered to be 'state-of-the-art' in local government, the way that the City of Oregon City established the capability to develop and use it provides a good example of innovative practice.

The City of Oregon City's integrated GIS and asset management systems (AMS) provides many benefits. In interviews with City of Oregon City staff, they provided examples of the ability to quickly and accurately quantify the costs of incidents such as water main breaks and the impacts of natural disasters on public infrastructure (J. Lewis, personal communication, September 7, 2019). The staff spoke of the significant financial and time efficiencies they have been able to achieve from having an integrated system.

The City of Oregon City's implementation of an integrated GIS and AMS platform has been a long-term project that has made significant process over the last five years. During interviews, City of Oregon City staff briefly outlined the history of the implementation. They spoke of the City of Oregon City having had disjointed AMS and GIS systems for many years and that only a small part of the existing AMS's capability was being used (M. Pooschke, personal communication, September 7, 2019). The City of Oregon City initially recruited a staff member dedicated to exploiting the full capability of their AMS. This involved extensive data entry from as-built construction drawings and data cleansing. The City of Oregon City then established new processes to ensure that new and updated data would flow to the AMS. This involved collecting data from office-based staff dealing with different assets such as fleet, water, and sewer assets, and the public realm such as the roads and sidewalks in the right-of-way. Staff interviewed spoke of the staggered manner by which they established this continuous data flow. They worked closely with different teams to ensure that the quality and timeliness of data was high and that the change to existing processes was minimal (M. Pooschke, personal communication, September 7, 2019). Concurrently, the City of Oregon City's GIS was further developed by an increased in-house team of two staff.

Initial areas of focus for the GIS was to link it to the AMS. The aim and eventual outcome was to provide a user-friendly platform on which asset data could be easily displayed. Staff spoke of the iterative nature of the development of the GIS. Once an initial high-quality data set was established in the AMS it was then linked to the GIS. This enabled wider audience access to the AMS data, in turn providing an opportunity for other areas of the organisation to provide feedback on where there were errors or omissions and helping to improve the overall data quality and building user acceptance and buy-in into the systems (M. Pooschke, personal communication, September 7, 2019) (K. England, personal communication, September 7, 2019).

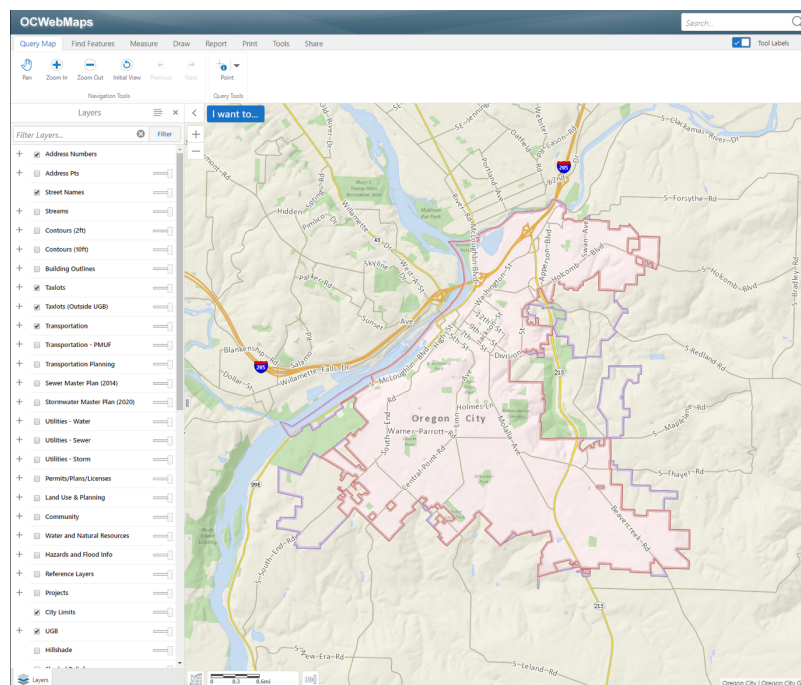


Figure 4 – City of Oregon City's Public GIS Portal (City of Oregon City Website)

When interviewed, staff detailed the challenges the City of Oregon City faced when rolling out the integrated GIS and AMS to field-based crews, and how they overcame them with thoughtful change management. Once the system had been established with appropriate data flows and connections to ensure it was user friendly, it was rolled-out to field-based crews. The intent

was to enable work requests and asset information to be made available in the field, as well as providing a more accurate way for work crews to record time, materials, and their work. Ultimately, this information helped to shift to a more efficient asset management model.

Asset management staff spoke of the challenges they faced to have long-serving field-based staff to adopt the system and to shift away from existing methods such as hand-written notes and clipboards. They spoke of high degrees of cynicism towards the technology and a lack of trust in the intent of the roll-out (M. Pooschke, personal communication, September 7, 2019). Furthermore, they described the approach that they took to address these concerns and challenges. This included starting the roll out with key influential supervisors and team leaders and rolling out the new tablets and systems to them individually, followed by providing extensive one-on-one, in the field training to each supervisor and giving regular feedback on data quality and timeliness issues. In one example, they spoke of a discussion with a supervisor about his frustrations with having crews regularly turn up to repair water mains with the incorrect fittings. The asset management team responded by adjusting the system to ensure that the digital forms and workflows on the tablet would help to reduce the likelihood that this work occur. This helped to engender goodwill with the supervisors who were then able to influence their crews. During interviews, the staff spoke of the patience that was required in the beginning, but that after a few years, a critical mass began to be established. While not all supervisors and staff could be convinced to use the new system, the majority eventually adopted it and those who remained resistant became compelled by the established social norms in the groups (M. Pooschke, personal communication, September 7, 2019) (J. Lewis, personal communication, September 7, 2019).

The roll-out of the integrated GIS and AMS in the City of Oregon City has provided extensive benefits. The system has enabled an evidence-based asset management approach to

become the adopted standard within the City of Oregon City. The system has also greatly improved customer service by clearly linking requests for service to assets reducing the amount of re-work and wasteful work (City of Oregon City, 2018). Additionally, the system has provided an easy and cost-effective way for the City of Oregon City to participate in and report on asset initiatives such as the Tree City USA program (Arbor Day Foundation, 2020).

The City of Oregon City's experience of implementing an integrated GIS and asset management system is a great example of technological innovation. The technology that was employed, an asset management system, field-based tablets, a GIS system, etc. is readily available and all are commonly used by many local governments. Oregon City's success has been how they have brought these technologies together, with their staff. The City's experience points to overcoming numerous common barriers to successful innovation. A key to the implementation was the ability of the organisation to set aside immediate delivery and administrative pressures to provide the time and space for genuine change management to be rolled-out alongside the implementation of the technology.

#### **4.6 City of Elmhurst – Acoustic Leak Detection**

The City of Elmhurst is a small municipality in the suburbs of Chicago, Illinois, in the United States of America. The City has a population of 46,662 people (City of Elmhurst, 2018). The City of Elmhurst has 262 staff, or approximately one staff member per 178 residents, which is approximately in-line with workforce sizes relative to population across suburban municipalities in and around Chicago.

Since 2016, the City of Elmhurst has implemented the roll-out of the largest fixed acoustic sensor network in the United States of America, that combined with remote water metering, is used to detect leaks within the public potable water supply network and within private properties

(Hughes & Venkatesh, 2016). The program commenced in 2016, with the selection of an internal team to drive the project. In July 2017, the City of Elmhurst's City Council approved the commencement of the program with a series of meter changeovers, construction of the dedicated wireless communication network, 170 miles of leak detection assessments, and the development of a customer water services web portal. In 2018, a wider roll-out commenced with the second-generation acoustic sensors with the system fully deployed thereafter. The complete system includes over 600 sensors, each monitoring an acoustic radius of approximately 1,325 feet (P. Burris, personal communication, September 13, 2019).



*Figure 5 – Integrated acoustic sensor & fire hydrant (Kurt Pitts)*

The network has resulted in significant cost savings and helped to target asset renewal inspection to optimise the operation of the City of Elmhurst's potable water distribution system (City of Elmhurst, 2018). The project also established a customer web-portal that makes live water consumption and billing data available to customers (P. Burris, personal communication, September 13, 2019).

The roll-out of the acoustic leak detection system at the City of Elmhurst provides an illustrative example of the importance of supportive leadership, and thereby the importance of a supportive culture, to successfully implement innovations (Mulgan & Albury, 2003).

The leak detection network was highly technically innovative at the time of its implementation and remains so today. The technical challenges faced by the City of Elmhurst and their contractors to roll-out such a large network were formidable. In interviews with City of Elmhurst staff, many identified that the program was not instantly successful and faced considerable challenges during the initial roll-out, with sensor reliability, erroneous data, inconsistent installation quality, and vandalism (P. Burris, personal communication, September 13, 2019). Issues reported included over 150 acoustic sensors not reporting accurate data, sensors installed incorrectly, and sensors that were inadvertently installed at incorrect locations (P. Burris, personal communication, September 13, 2019). Despite these challenges, the City of Elmhurst stuck with the program and has seen significant benefits, including savings in the order of \$270,000 USD per annum in unaccounted for water purchased from the DuPage Water Commission but not charged for delivery to end users (P. Burris, personal communication, September 13, 2019). In addition, the system has ultimately driven changes in the investment strategy of the City of Elmhurst, as well as behavior change in residents and water consumers.

An interesting element of the project's instigation was the involvement of the City of Elmhurst's elected officials in the early phases of the project. The program's early stages are articulated in a report from the City of Elmhurst's Public Works and Building Board to the City Council in July 2017 (City of Elmhurst, 2017). The report outlines a comprehensive business case and technical feasibility assessment for investment in a meter replacement and leak detection system installation program. The report identifies a number of steps undertaken by the City of

Elmhurst's officers and elected officials to implement the program; this included a pilot scheme undertaken on the homes of the City of Elmhurst's elected officials and staff to assess the impact on property owners before a broader roll-out to the community. In interviews, the City of Elmhurst's Mayor spoke of the excitement of being involved in the project and need for public leaders to demonstrate their commitment to innovation to both the community and as a sign of support for the organisation (S. Morley, personal communication, September 13, 2019). Furthermore, the Mayor of Elmhurst provided anecdotes on his experience of the trial, including the errors and false alarms that he experienced. He explained that it was important that any 'bugs' in the system be resolved with the elected officials before rolling the system out to the broader community (S. Morley, personal communication, September 13, 2019). The involvement of the City of Elmhurst's leaders in the trial of the system points to a highly supportive culture within the City of Elmhurst that enabled the innovative project.

It is apparent that a key to the success of the innovation has been the relationship between elected officials and the City of Elmhurst's public works department, as evidenced in the July 2017 report (City of Elmhurst, 2017). The involvement of the elected officials helped to build external and internal support for the innovation, signaling to the community that the investment was worthwhile, helping to allay concerns whilst also signaling to the organisation that the program had support. The personal buy-in of the elected officials into the innovation provides a great example of how a culture can be created that supports innovation and provides the space for iterative learning and development in the public sector.



#### **4.7 Village of Lake in the Hills – Asset Management Fundamentals**

A common finding of studies into organisations is that a key to creating the environment for sustainable innovation is to avoid reactive or ad hoc responses that are driven by short-term needs, but rather, focus on longer-term objectives (Martin, 2001; Mulgan & Albury, 2003; United Nations, 2005). This challenge to set aside the everyday difficulties and to focus on the future is often exacerbated in organisations that have less financial means (Bekkers et al., 2013). One way that this issue manifests in local governments is that large, resource rich organisations use their means to establish dedicated innovation teams, invest in expensive and sophisticated technology and engage specialist consultants and professional services firms to drive innovations. Smaller regional local governments have less means to be able to ‘buy’ innovation. The experience of The Village of Lake in the Hills challenges this accepted wisdom and demonstrates that innovative practice can be achieved despite limited resources.

The Village of Lake in the Hills is a small municipality outside of Chicago in Illinois. The Village is home to 29,228 people, employs 125 staff, had an annual budget of \$26,100,000 (USD) in the 2018 fiscal year (Village of Lake in the Hills, 2018). Compared to other local governments discussed in this report, the Village has considerably less financial means at its disposal to provide services to its community.

The Village recently implemented a ‘low cost’ asset management system to help it better manage its infrastructure and fleet. The implementation of this system highlights the innovations that can take place when short-termism and ad hocism are set aside.

#### **4.8 City of Boston – ‘Skunk Works for Innovation’**

Boston, Massachusetts sits at the heart of an innovation and technology cluster in the north-east of the United States of America. Local institutions include the illustrious Harvard University

and The Massachusetts Institute of Technology. The area is also home to many of the world's leading innovative companies, including management consultancy Bain & Company P/L, technology company EMC Corporation P/L, robotics and mechatronics company Boston Dynamics P/L, and major defense contractor Raytheon P/L. Therefore, it is to be expected that the local government in Massachusetts, The City of Boston, is renowned for being at the peak of innovation in the public sector (Cullen, 2016; Gandy Jr & Nemorin, 2020).

In interviews with staff at the City of Boston, they spoke of the influence that the local community's high expectations around innovation and technology have on the organisation, which has resulted in innovation being embedded into most activities at the City of Boston (C. Osgood, personal communication, September 17, 2019). Whilst many organisations often debate the merits of centralising or decentralising innovation, the City of Boston appears to have done both to ensure that they rise to the expectations of their community.

The City of Boston has established a centralised innovation department called the New Urban Mechanics department (City of Boston, 2020). Recognising the expectations of the community and the high-profile nature of innovation in the area, the department reports directly to the City of Boston's Mayor (C. Osgood, personal communication, September 17, 2019). The department's role is stated as working 'across departments and communities to explore, experiment, and evaluate new approaches to government and civic life' (City of Boston, 2020). In interviews with staff from the broader City of Boston, they spoke of the New Urban Mechanics department as being a conduit to engage communities in trialing innovations (C. Osgood, personal communication, September 17, 2019).

The City of Boston, through the New Urban Mechanics department, operates an engagement program for technology innovation called Beta Blocks. The Beta Blocks program

involves working closely with small communities on trials of new technologies in the public realm. Recent projects have included the roll-out of environmental sensors in neighbourhoods and developing an autonomous vehicle test bed (City of Boston, 2018a). In interviews with City of Boston staff, they spoke of the Beta Blocks program as being a way that the City of Boston engages with the community to trial small innovations in a way where the community is empowered to provide feedback on the approaches, helping to both build trust between the local community and the City of Boston but also provide valuable in-field validation of what works and what doesn't (C. Osgood, personal communication, September 17, 2019). Through initiatives such as the Beta Blocks program, the City of Boston is aiming to address many common barriers to innovation including raising the organisation's and community's acceptance for iterative learning through trial and error, a vital step when at the vanguard of technological innovation.

The City of Boston has also taken a decentralised approach to innovation. For example, the City of Boston's transportation department maintains its own information technology team, embedded into the transported related operations of the department. In interviews with staff, staff described the local team as a 'skunkworks', referencing the famous team at the defense contractor Lockheed Martin renowned for their development of the cutting-edge fighter jets and reconnaissance planes (P. Taylor, personal communication, September 17, 2019). The staff went on to describe an example of how such an embedded resourcing approach has been successful in the in-house development of a bespoke software package for the management of permitting and works approvals in the public right-of-way (P. Taylor, personal communication, September 17, 2019).

The City of Boston's approach of giving departments the skills and expertise to use technology to innovate shares similarities with The City of Vancouver's approach to innovation

but was not apparent in most local governments visited throughout North America. Discussions with staff at the City of Boston often involved examples of failures or innovations that did not work. This mature approach to iterative learning and failure is a trait that is unique to innovative organisations (Mulgan & Albury, 2003). It is posited that this approach of devolved innovation is only successful in organisations with where highly developed and engrained innovative cultures already exist.

Staff from the City of Boston spoke of the key facets to the organisation's approach to technological innovation. They spoke of the need to avoid being 'dazzled by high-tech solutions' and the importance of trying to find a solution to an existing problem, not seeking to find a problem that a technology can solve ((Osgood, C. (2019, September 17), Personal interview), (Taylor, P. (2019, September 17), Personal interview), (Choe, K. (2019, September 17), Personal interview), and (Donaghy, M. (2019, September 17), Personal interview)). Staff offered numerous examples, including the trial roll-outs of smart screens and kiosks across the city and the use of advanced technology for weather forecasting.

Staff interviewed also provided insights into how the City of Boston implements innovations and ensures that they become engrained into normal business processes. An example provided was the public right-of-way-permitting software program that was developed in-house. They spoke of the importance of when implementing a new technology or innovation that its roll-out is accompanied by changes in processes or, put simply, to 'how people do their job'. The importance of sustaining the innovation through embedding it into business practice and not tacitly tolerating or ignoring short-cuts or not following the approved processes was also identified (P. Taylor, personal communication, September 17, 2019). This approach shares many similarities with the City of Oregon City's roll-out of their integrated GIS and asset management system.

A key area of their successful change management processes was to follow up all data errors and work with individuals to ensure that the system was used appropriately. These approaches and observations go to the concept of avoiding 'ad hocism', which studies identify as a barrier to creating successful innovative cultures in the public sector (Mulgan & Albury, 2003; United Nations, 2005).

## **5. Observations and Learnings**

Most local governments visited in North America across Canada and The United States were observed to have high levels of general innovation, supported by entrepreneurial cultures within their organisations and communities, mature and constructive approaches to iterative learning and failure, and passionate, well-educated, well-informed and skilled staff.

There is a wide variability of skills, maturities and approaches to the use of technology in innovation across the Canadian and North American local governments observed. Generally, but certainly not exclusively, larger urban local government organisations use technology to a greater degree to innovate. Like Australia, it was observed that rural and regional local governments are often hindered by limited financial means. Whilst this city-country divide was clear with the technologies used, it was not a factor in innovative practice, with many smaller local governments being highly innovative.

### **5.1 The Concept of ‘Public Works’**

The United States of America and Canada have a concept of ‘public works’ that is not apparent in the general Australian lexicon. In Canada and USA, it is suggested that the public works umbrella is a key ingredient of the observed successful innovation in the local governments observed. Adopting a similar approach in the Australian local government context stands to provide similar benefits.

Public works is a term that covers the areas of planning, design, engineering, construction, maintenance, cleansing, asset management, and much more. It generally refers to activities that create and maintain public infrastructure, as the peak body, in the USA, the American Public Works Association (APWA) defines public works as ‘the combination of physical assets, management practices, policies, and personnel necessary for government to provide and sustain structures and

services essential to the welfare and acceptable quality of life for its citizens' (American Public Works Association, 2020). The term is very broad and, therefore, encompasses a large number of different discipline cohorts. This was on display at the 2019 American Public Works Association annual conference, PWX. The conference brought together such diverse topics as asset management, surveying, hydrological modelling, project management, electric vehicles, earth moving equipment operation, fleet management systems, occupational health and safety demonstrations and much more (American Public Works Association, 2019b). The concept of public works is unifying. It brings together a large, eclectic group of people and helps to assign them a common purpose. This is not something that exists prominently in Australian local government and in the broader Australian society.

The public works identity provides practical benefits, it binds together different areas that may often have little to do with each other. It also provides a critical mass that enables effective sector wide advocacy and a higher profile in society for this core function (American Public Works Association, 2019a).

The impact of the notion of 'public works' was observed at many local governments across Canada and North America at the micro-level. Most local governments have a public works department which often incorporates white collar engineering and cleric roles with blue collar construction, maintenance and field-workers. Similarly, most local governments in North America and Canada had managers or executives with the term 'public works' in their titles. Finally, many organisations also have public works committees and community consultation forums.

It is suggested that the concept of public works is an enabler of innovation. The unifying nature of the umbrella term 'public works' breaks down barriers and provides a sense of collective purpose between vastly different cohorts. The broad and diverse group of professions and the

experiences of these people create a virtual polyglot society that is enabled to share these different perspectives. Diversity is frequently identified as being a key enabler for innovation (Bekkers et al., 2013; Borins, 2001; Mulgan & Albury, 2003; United Nations, 2005). Fundamentally, the unifying term of public works brings together people whose diverse skills, views and experiences can be shared creating the opportunity for innovation.

Organisations such as the Institute of Public Works Engineering Australasia (IPWEA) aim to establish a similar community of practice around public works in Australia. The IPWEA has strong linkages to the engineering sector and are a technical committee under the national engineering body, Engineers Australia (Institute of Public Works Engineering Australasia, 2020). The American experience would suggest that the IPWEA's approach is consistent with building a community of practice in which innovation can be fostered.

## **5.2 Recognising and Valuing Technical Skills**

It is theorised that an enabling element of the high levels of innovation seen across the organisations visited in Canada and The United States of America is the high value and authority placed upon technical advice and technical staff. In most of the local governments identified in the earlier case studies, public works consisting of engineering, asset management, and asset maintenance was observed as having a prominent and high-profile role. Many of the innovative practices outlined in this report were led by, or at least initially justified based on, technical areas.

It was observed that The City of Vancouver, District of West Vancouver, and the Vancouver-Fraser Port Authority in Canada all have high-profile and revered engineering cohorts within their organisations that are strongly linked to the rest of their organisation. It is apparent that the regulatory framework in British Columbia supports this, effectively helping to professionalise the engineering sector (Engineers & Geoscientists British Columbia, 2017). Interviews with staff at



the Vancouver-Fraser Port Authority identified the practical implications of this governance framework. Staff spoke of the need for drawings, designs, and reports of an engineering nature to be approved by authorised and accredited engineers and identified that this was engrained in the systems and processes of public works organisations (P. Cohen, personal communication, September 4, 2019). Interviews with finance, asset management and engineering staff at the District of West Vancouver similarly highlighted the strong linkages that existed in that organisation between dealing with a challenging financial situation and technical, data-led asset management and engineering investment decisions (R. Fung, personal communication, September 4, 2019). This hand-in-glove, synergistic relationship between the technical areas of the organisation and the rest was also apparent in the development of the North-East False Creek project at The City of Vancouver. Staff spoke of the iterative development of the ultimate masterplan through a series of technical assessments, community engagement sessions, elected official engagement, and revisions, where engineers and other technical practitioners would be actively involved in engagement sessions. A telling observation is that the engineering staff involved in the planning of utility diversions are identified by name in the North-East False Creek masterplan (City of Vancouver, 2018b).

The highly innovative City of Boston takes a similar approach to creating a high profile for their technical departments. For example, the head of the transport area held the title of ‘Chief of Streets’. This title conjures up ideas of parity with other department heads such as the Chief of Police or Chief of the Fire Brigade.

It is argued that these subtle nods to the relative importance and value of the technical, public works skills within organisations is empowering and a key enabler of innovation. It increases the prominence of technical skills, thereby lending technical grounded advice greater

credence in non-technical setting such as in the public forum or in debate amongst elected officials. This was clearly evidenced in The City of Elmhurst's roll-out of the acoustic sensor network on their potable water main system, in particular the willingness of the elected officials to partake in the trial phase of the roll-out.

The value placed on technical expertise was also apparent at many organisations in how they engaged with their local communities. The City of Oregon City's public web-portal for their GIS and asset management system provided extensive and detailed data on public works, infrastructure, maintenance and renewal programs (City of Oregon City, 2020). Similarly, The City of Portland has an extensive open data policy, providing access to wide ranging data sets on their Portland Urban Data Lake, or PUDL (City of Portland, 2020). Whilst open data programs are not uncommon, it was observed that many open data initiatives at the organisations visited were much broader than comparative approaches of local governments in Australia.

Data driven decision making is a key element of all technical disciplines, and it is also an enabler of innovation. Relying on data in decision making avoids the pit fall of ad hocism. Data driven decision making ensures innovations are evidence based, are more likely to be assessed objectively and rationally. The observed approach at many local governments of raising the prominence of their technical disciplines and more actively using data in their engagement with their communities creates the opportunity for innovation.

A key difference between local governments in the State of Victoria in Australia and those in Canada and North America is their scope and prominence in their community's lives. Local governments in North America are more singularly focused on asset management and public works. In Victoria, local governments are often much broader in their service delivery with less of a focus on much of the physical infrastructure, with the state taking responsibility for larger, more high-

profile infrastructure, such as transportation networks and water supply. Therefore, there is less technical critical mass at the local government level in Victoria. Additionally, the public works that local government in Victoria often provides is less likely to take a prominent role in the zeitgeist of their local community. This provides a significant challenge to raising the profile and value of technical skills at the local government level in Victoria.

### **5.3 Creativity and Conformity**

The most successfully innovative local governments observed in Canada and North America had managed to balance creativity and conformity across their organisations. These dual focuses provided the space and flexibility for innovative approaches to be developed but also ensured that when they were implemented, they were successful.

The City of Boston's staff spoke of the need to create the space for innovation in their workdays (K. Choe, personal communication, September 17, 2019). Furthermore, they identified the need to allow people time to be creative, to think of new approaches, and to provide breathing space from their day to day workload (K. Choe, personal communication, September 17, 2019).

The City of Oregon City's introduction of their integrated GIS and asset management system provides a great example of ensuring conformity. Their change management approach was to patiently and deliberately roll-out the system slowly, ensuring that individual staff were using it correctly and user issues were as addressed as they arose. This ensured that the new system was used appropriately and the benefits that were realised. This patient change management approach takes a significant amount of time and requires the organisation to set aside the need to have an immediate, short-term outcome, for the hope of achieving longer-term objectives.

The City of Boston's mantra of 'no shortcuts' and ensuring that existing processes and systems are used properly provides an interesting insight. When interviewed, staff stated that

ensuring existing systems and processes are followed is not only vital to successfully scaling up new innovations, but also as a great way to identify where ‘business as usual’ processes are not working and are suitable candidates for an innovative solution.

## 6. Conclusions

The case to increase innovation in local governments in Victoria to provide better outcomes for their local communities is compelling. Local governments play a vital role in the quality of life of their citizens and improvements in the way local governments function will drive improvements for all. Successive studies into local governments across the world, and in Victoria in particular, have identified opportunities to improve productivity, efficiency and effectiveness. Innovations in these areas can improve a community's trust of this level of government and strongly place local governments to help tackle the issues and challenges that face their communities.

Whilst innovation can drive direct improvements in the community through improved service provision, better customer experiences and increased reliability and accountability of local government services, it can also indirectly benefit the community through improving the job satisfaction and motivation of local government staff. Evident at many local governments visited across Canada and North America was the high degrees of staff engagement and motivation. Innovation, particularly technology led innovation, can help to remove frustrating and monotonous elements of roles. This frees up employees to focus on their skills and talents, providing a more rewarding and meaningful job. These are key elements in the development and retention of a highly effective workforce.

Innovation and continuous improvement methodologies have their roots in productivity and efficiency efforts. Technology led innovation in local government can help to deliver better value for money from the expenditure of ratepayer funds. Reducing waste, reducing staff turnover and the costs of recruitment and onboarding, and increasing staff and resource productivity all help to squeeze the most value from each dollar spent. The examples of innovation highlighted in this report shed light on the misnomer that it is expensive to innovate. The example at the City of

Oregon City, with the roll-out of their integrated GIS and asset management systems, demonstrates that with moderate investment, coupled with patient and persistent change management and cultural change programs, high returns on investment can be achieved.

Innovation, led through the use of new and emerging technology, has considerable promise for the local government sector. The use of technology enables local governments to tackle longstanding and systemic barriers to innovation such as meaningful and immersive engagement and increasing transparency in government decision making. Technology led innovation has the potential to drive significant financial efficiencies and better targeting of investment, improving the equity of service provision and challenging prejudices and stereotypes.

The innovative local governments highlighted in this report all had strong leadership supporting and challenging their staff to innovate. This leadership, be it at the elected official level, such as at the City of Elmhurst, or at the senior management levels, such as at The City of Boston and the City of Oregon City, creates the urgency and space for innovation to occur. Patient yet demanding leadership drives people to look for new solutions to problems but also provides the opportunity for risk taking. These are the key ingredients of innovation. The ability of leaders to look beyond immediate day-to-day challenges and create a compelling vision for their teams often provides the catalyst for people to look for new solutions. For innovation to be successful, leaders need to couple that desire for a better way, with patience and understanding that innovation is messy, and that failure and iteration are part of the process.

Victorian local governments can take lessons from the experience of their Canadian and North American counterparts in developing highly innovative cultures in their organisations. Victorian local government practitioners should see the potential of raising the profile of technical expertise and data driven decision making into the public realm, to drive innovation. The high-

profile valuing of technical skills across the public works sector in Canada and North America is an empowering tool that helps identify innovations, upskill staff, creates supportive and challenging communities of practice and helps to build trust between the community, elected officials and technicians. Ultimately, the valuing of technical skills helps to give technicians the personal, team and organisational imprimatur to bring their technical skills to bare in new and innovative ways, contributing to improvements that benefit the community at large.

Victorian local governments should invest in their technical staff, expose them to different ways of thinking, equip them with the skills and knowledge to tackle difficult problems in different ways. Professional development, formal accreditation, registration and accreditation of technical professionals, participation in conferences and the preparation of publications are key to helping to build and maintain a strong unifying sense of professionalism.

Successful, innovative organisations continually fight the scourge of ad hocism and in doing so identify areas for innovation and ensure that innovations successfully integrate into the organisation's way of doing business. It is imperative that processes, systems and ways of business add value and are adhered to. Regular auditing, continuous improvement, quality assurance and process design should ensure that endorsed processes and systems are followed. In the course of quality assurance, areas for improvement invariably arise. These should be the initial focus for innovation. Whilst shortcutting and ad hocism are often driven by worthwhile and important short-term goals, they are pervasive and insidious. If systems and processes are not being followed, then organisations should identify that and change them.

The successful local governments case studies in Canada and North America had mature and constructive approaches to failure and iterative learning. Local governments in Victoria that which to encourage innovation must accept that failure, poor return on investment, and missteps

are key to improving the way things are done. Discussing and accepting trial and error are vital to creating a culture that supports innovation. It is critical that executives and leaders are honest and brave with elected officials and the community about the likelihood for success and the importance of trial and error in trying new things. Staff and technicians should be encouraged to share with each other and wider communities of practice the difficulties and poor outcomes achieved in the pursuit of successful innovations.

A particular area for focus for Victorian local governments should be in the use and openness of data, as data spurs innovation. The organisations studied throughout Canada and North America all have diverse and expansive data sets available to their communities. Victorian local governments should accelerate and broaden their publication of data sets. Data should be captured and reported for internal purposes and for the community. For staff, data helps to focus attention and effort. For the community, data helps to ensure accountability and justification.

Local governments are part of their communities. They are accessible, accountable and acutely aware of the impact they have on their communities. Even small innovations in a local government can have a beneficial impact on their communities. The lessons from innovative local governments across Canada and North America are relevant to the Victorian context and can ultimately help to improve the outcomes that local government can provide for their communities.



## 6.1 Recommendations

Local governments who want to be more innovative need to do two things: Create the desire for a better future, and then create the space for that future to be created. The key element of this is having staff who have the capability, time and motivation to innovate.

The following initiatives are aimed at establishing a compelling reason to change (i.e. creating the desire for a better future), equipping staff with the right capabilities and motivations, and establishing an environment where iteration and learning through failure are not simply tolerated, but encouraged and rewarded.

1. Encourage and foster a culture of experimentation and iterative learning. Use coaching techniques such as the ‘Five Whys’ technique to encourage questioning of the status quo. The ‘Five Whys’ is a proven and simple technique that encourages innovation and experimentation to find solutions (Kohfeldt & Langhout, 2012; Müller & Thoring, 2012; Serrat, 2017).
2. Collect, publish, highlight, and plaster the walls with data and metrics. Most local governments have some form of data about the services they are providing. Make this prominent inside and outside the workplace. This can be as complex as data lakes and open data sharing platforms, to as simple as printed A3 posters of the top 10 customer request categories from last week stuck on the wall. Displaying data and metrics in-front of people helps them to think quantitatively and spurs people to ask ‘why’.
3. Actively partner with other organisations and offer staff secondment opportunities, for example, opportunities may include running undergraduate and graduate cadetship and workplace programs with universities and/or partnering with State level departments for secondment and work placements.

4. Ensure employee titles reflect the professionalism of technical disciplines. Use titles such as ‘Senior Engineer’ and ‘Coordinator of Engineering’.
5. Amend study assistance policies to ensure they incentivise and support the maintaining of professional accreditations (e.g. CPEng, CPA).
6. Create a master calendar of conferences, symposia, trade publications, and professional forums that are relevant to the work of the local government. Ensure that the organisation puts forth papers and award submissions as frequently as possible, and recognise awards and acknowledgements through internal and external communications.
7. Undertake regular audits and quality assurance assessments of existing systems and processes to ensure they are followed. If systems are not being used appropriately, change them.
8. Through IT policies and platforms, create a dynamic technology environment – i.e. allow employees to bring and use their own devices in the workplace and provide a clear and easy-to-follow pathway for employees to access or request software/hardware.
9. Place post nominals and qualifications on email signatures and business cards.
10. Amend position descriptions to require accreditations for technical professionals such as being a registered engineer, chartered accountant, etc.

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