

AUSSEN
WIRTSCHAFT
MARKET RESEARCH
AUSTRALIEN

AUSTRALIAN SMART CITIES

REPORT ON THE STATE OF AUSTRALIAN SMART CITIES: CHALLENGES AND OPPORTUNITIES

AUSSENWIRTSCHAFTSCENTER SYDNEY
MARCH 2021

go international
= Bundesministerium
Digitalisierung und
Wirtschaftsnaheort **WKO**
AUSSENWIRTSCHAFT AUSTRIA



Unser vollständiges Angebot zum Thema **Urban Technologies** (Veranstaltungen, Publikationen, Schlagzeilen etc.) finden Sie unter wko.at/aussenwirtschaft/urban-technologies.

Eine Information des

AußenwirtschaftCenters Sydney

T +61 2 9247 8581

E sydney@wko.at

W wko.at/aussenwirtschaft/au

f fb.com/aussenwirtschaft

🐦 twitter.com/wko_aw

in linkedin.com/company/aussenwirtschaft-austria

YouTube youtube.com/aussenwirtschaft

📺 flickr.com/aussenwirtschaftaustria

blog www.austria-ist-ueberall.at

In Zusammenarbeit mit

The Smart Urbanism Lab

School of Architecture, Design and Planning,
The University of Sydney

Erarbeitet von

Dr Sophia Maalsen

ARC DECRA Fellow and Senior Lecture in Urbanism
School of Architecture, Design and Planning

E: sophia.maalsen@sydney.edu.au

Professor Robyn Dowling

Dean and Head of School

School of Architecture, Design and Planning

E: robyn.dowling@sydney.edu.au

Dieser Branchenreport wurde im Rahmen der Internationalisierungsoffensive **go-international**, einer Förderinitiative des Bundesministeriums für Digitalisierung und Wirtschaftsstandort und der Wirtschaftskammer Österreich erstellt.

Das Werk ist urheberrechtlich geschützt. Alle Rechte, insbesondere die Rechte der Verbreitung, der Vervielfältigung, der Übersetzung, des Nachdrucks und die Wiedergabe auf fotomechanischem oder ähnlichem Wege durch Fotokopie, Mikrofilm oder andere elektronische Verfahren sowie der Speicherung in Datenverarbeitungsanlagen bleiben, auch bei nur auszugsweiser Verwertung, der Wirtschaftskammer Österreich – AUSSENWIRTSCHAFT AUSTRIA vorbehalten.

Die Wiedergabe mit Quellenangabe ist vorbehaltlich anders lautender Bestimmungen gestattet. Es wird darauf hingewiesen, dass alle Angaben trotz sorgfältiger Bearbeitung ohne Gewähr erfolgen und eine Haftung der Wirtschaftskammer Österreich – AUSSENWIRTSCHAFT AUSTRIA ausgeschlossen ist. Darüber hinaus ist jede gewerbliche Nutzung dieses Werkes der Wirtschaftskammer Österreich – AUSSENWIRTSCHAFT AUSTRIA vorbehalten.

© AUSSENWIRTSCHAFT AUSTRIA DER WKÖ
Offenlegung nach § 25 Mediengesetz i.d.g.F.

Herausgeber, Medieninhaber (Verleger) und Hersteller:
WIRTSCHAFTSKAMMER ÖSTERREICH / AUSSENWIRTSCHAFT AUSTRIA
Wiedner Hauptstraße 63, 1045 Wien
Redaktion: AUSSENWIRTSCHAFTSCENTERS SYDNEY, T +61 2 9247 8581
E sydney@wko.at, W wko.at/aussenwirtschaft/au

Table of Contents

Table of Contents	2
1 Executive Summary	4
2 Introduction	5
3 Australia’s Urban System: the importance of cities in the national economy	6
4 Governance Framework of Smart Cities in Australia	7
4.1 Tripartite Governance of Cities	7
4.2 Commonwealth of Australia Smart City Initiatives	7
4.2.1 City Deals and Regional Deals:	7
4.2.2 Smart Cities and Suburbs Program	8
4.2.3 Regional Connectivity Program	8
4.3 State Government Smart City Initiatives	8
4.3.1 NSW Smart Places and Spaces Acceleration Program	8
4.3.2 NSW Digital Restart Fund	9
4.3.3 Victoria Gigabit State	9
4.3.4 Policy Alignment	9
4.3.5 Public-Private Partnerships	9
4.3.6 Case Study: Western Sydney Parkland City	9
5 Smart Cities in Australia in Overview	12
5.1 Smart City Context in Large Cities	12
5.1.1 Summary	12
5.1.2 Identified Priorities	13
6 Opportunity Landscape in Specific Smart City Domains	15
6.1 Smart Governance	15
6.2 Smart Mobility	15
6.3 Smart Spaces and Places:	15
6.3.1 Smart Environment:	16
6.3.2 Smart and Safe Places for Everyone:	16
6.3.3 Smart and Healthy Places	17
6.3.4 Barriers	17
6.4 Innovation economy and startups	18
6.4.1 Key Barriers: Connectivity	18
6.4.2 Opportunities	19
6.4.3 Case Study: Tonsley Innovation District	19
7 Smart City Context in Small Cities and Regional Centers	21
7.1 Summary	21
7.2 Case Study: Sunshine Coast Council	21
7.3 Identified Priorities	22
7.4 Smart Agriculture	22
7.4.1 Key Barriers and Challenges	23
7.4.2 Key Opportunities	24

8	Key Opportunities and Key Challenges.....	25
8.1	Opportunities	25
8.2	Challenges	25
8.3	Stakeholders.....	26
9	Conclusion and recommendations	27
10	References	28

Australian Smart Cities

1 Executive Summary

Australia offers a unique market for smart technologies with a distinctive pattern of urban settlement alongside thriving regional and rural areas. 70 percent of the population live in cities but the importance of the regions to Australia's economy and identity means that when talking about smart cities in Australia, it is imperative to include urban centers and regional and rural centers.

This report provides an overview of Australian smart cities and identifies key areas of investment. It begins with a background to Australia's urban system noting the importance of both cities and the regions to Australia's economy. Next, the tripartite governance framework of Australian cities is detailed to provide context to the way cities are governed and funded; before detailing the key areas of smart city activity and identifying opportunities and challenges for investment.

Broadly, the key drivers of smart city implementation in Australia are to improve council service delivery, make the city more liveable, e.g., make it more attractive, save operating costs, and create new industries and local jobs (Australian Government n.d a, 4). This is consistent across both large cities and smaller and regional centers although the implementation, applications and demands of technology will differ. Considering this the report identifies the opportunities in large cities and smaller and regional centers. The report identifies four key priorities for smart cities in large city contexts:

- Smart Governance
- Smart Mobility
- Smart Spaces and Places
- Innovation Districts and the innovation and knowledge economy

Smaller cities and regional centers also prioritise the above four areas, but the report identifies the addition of another significant priority area, specific to regional contexts:

- Smart Agriculture

The growth of smart cities in Australia is underpinned by:

- Demonstrated investment priority from all three levels of government
- Transition from mining and manufacturing to the knowledge and innovation economy
- Appetite for innovation

However, the implementation of smart cities faces some challenges, namely:

- Lack of reliable connectivity and infrastructure provision
- Lack of relevant skills in some areas
- Climate extremes

2 Introduction

In a global context Australia is characterized as a late-adopter of smart cities as a strategic planning directive, despite having adopted smart technologies for some time. The Global Financial Crisis was a key catalyst for the emergence of smart cities in the UK, Europe and US, where smart city technologies and practices were adopted in response to austerity measures. Australia, however, weathered the GFC comparatively well. As a result, Australian smart cities emerged as part of the broader goal of transitioning the Australian economy away from its reliance on mining and toward a knowledge and service economy. This report outlines the geographic, economic and policy context for smart cities in Australia and the significant funding and policy programs driving smart city development. It then describes the focus of smart cities, and the needs and opportunities identified by organisations involved in developing smart cities.

3 Australia's Urban System: the importance of cities in the national economy

Australia has a globally distinctive pattern of urban settlement. It is an urban nation, with 70% of its 25 million people living in major cities and 40% (10 million) living in its two largest cities of Sydney and Melbourne. Cities are critical to the nation's economic performance. For example, in 2019, the City of Melbourne (covering a geographical area of 37.7 km²) accounted for 7 percent of the Australian economy (City of Melbourne 2020). Greater Sydney generates almost a quarter of Australia's GDP (PWC 2018).

Historically, mining and agriculture have been the mainstay of the Australian economy. Currently, Australia's economic development planning is firmly focused on the 'innovation economy' and technology and knowledge-intensive sectors in particular. Cities play a key role as the settings for these sectors with the performance critical to national prosperity (Commonwealth Government of Australia, 2016, 8). The envisioned economic transition is heavily reliant on Sydney and Melbourne, with their concentration of industries and organisations to pull their economic weight (Commonwealth Government of Australia, 2016, 2). As part of this economic transition, some traditional industries are getting a smart update – traditional manufacturing is becoming advanced manufacturing; and agriculture is seeing a rapid uptake of cutting-edge technologies. Australia is consequently a country of smart cities and smart regions.

4 Governance Framework of Smart Cities in Australia

4.1 TRIPARTITE GOVERNANCE OF CITIES

Cities, and therefore smart cities, in Australia, are shaped by three levels of government. Australia is a Federal system, with responsibilities for cities taken by national, state and local governments. The national government does not have direct responsibility for cities, with its powers instead focused on the economy, taxation and social services. However, as we outline below, its economic focus has meant that it is critical to the creation of smart cities in Australia. State and Territory Governments, of which there are 8 in Australia (New South Wales, Australian Capital Territory, Queensland, Victoria, South Australia, Western Australia, Tasmania and the Northern Territory) have most significant jurisdiction in the urban space, with principal responsibilities for housing, planning frameworks, city infrastructure, environment and transport. Local authorities, of which there are more than 500 in Australia, typically oversee parks and recreation, waste collection, and social services such as libraries and community centres. These multiple levels of government also work together rather than alone.

Government programs that catalyse smart cities, and associated direct and indirect government funding, are fundamental to the development of smart cities in Australia. This is partly because of the scale of investment involved. Local government budgets frequently do not extend to significant investment in smart technologies. This is particularly the case for regional towns and smaller cities, which typically do not have the budgets or market interest seen in larger urban centers. It would be common, for example, for national or state programs to fund local governments to deliver specific local initiatives, as outlined in the next section. The focus on city building and infrastructure in Australian cities over the past ten years also entails significant government involvement, though often through public-private partnerships. For example, the building of motorways such as WestConnex in Sydney, and CityLink in Melbourne were undertaken with the Transurban Group. Multi-level government 'collaboration' is deemed critical to the success of smart urbanism in Australia. Any government or corporation therefore needs to navigate through this complex context in order to advance integrated smart city strategies and policies (Dowling et al 2019). The following sections outline the major programs from each level of government.

4.2 COMMONWEALTH OF AUSTRALIA SMART CITY INITIATIVES

The Commonwealth of Australia's [Smart Cities Plan](#) provides a road map of the link between smart cities, economic development and innovation. It states:

As our economy continues to transition and our knowledge based industries grow, so too do our cities. To respond to this growth, and take advantage of tomorrow's economic opportunities, we need to rethink the way our cities are planned, built and managed today.

The plan is comprised of a number of different programs, as described below.

4.2.1 City Deals and Regional Deals:

City deals establish formal partnerships between the three levels of government and the community. The partnership works towards shared objectives related to creating liveable cities and generating economic productivity. The first City Deal was established in Townsville, QLD, in December 2016. Nine City Deals have been established, with economic development with smart innovation at its core, and their implementation focused on the redevelopment of regional centres. These deals encompass the cities of Adelaide, Darwin, Geelong, Hobart, Launceston, Perth and Townsville, and the metropolitan regions of South East Queensland and Western Sydney (Department of Infrastructure, Transport, Regional Development and Communications, n.d.a). The deals are long term commitments (generally 10-15 years) between the Australian Government, State Government, and relevant local councils.

Regional deals are part of the same program as City Deals, bringing three levels of government together to deliver around a clear set of objectives relevant to a region's specific advantages, challenges and assets. Regional Deals prioritise community-identified projects through a 'place-based approach.'

4.2.2 Smart Cities and Suburbs Program

This is a **\$50 million Program** supporting the delivery of innovative smart city projects that improve the liveability, productivity and sustainability of cities and towns across Australia.

This program explicitly funded local governments to create smart cities by partnering with technology corporations or other stakeholders like universities. Two rounds of projects have been funded, as described on the **Smart Cities Collaboration Platform**. Projects in round 1 were awarded in 2017, started in 2018 and completed in 2019. Round 2 projects were awarded in 2018, started in 2019 and finished in 2020.

A **Smart Cities Communities of Practice** has emerged from the Smart Cities and Suburbs Program that is intended to facilitate information sharing and collaboration.

4.2.3 Regional Connectivity Program

The Australian Government has recently signalled increasing digital connectivity in the regions as a priority, allocating \$90 million of funding under the **Regional Connectivity Program**. The RCP, announced in 2021, has allocated \$90 million to fund place-based projects that improve digital connectivity in 81 rural communities. Project are focused on delivering connectivity solutions via mobile and broadband services, and the creation of wireless networks. Additional co-contributions from funding recipients, local businesses, community development organisations and state, territory and local governments, bring the total funding to more than \$180 million (Booth 2021). Funded projects range from upgrading mobile network capacity in small towns to the delivery of large-scale fixed wireless broadband networks across whole regions (Booth 2021).

4.3 STATE GOVERNMENT SMART CITY INITIATIVES

State-level planning also connects smart cities to the innovation agenda. The NSW Government's (2016) Innovation Strategy reads:

The government is committed to putting Sydney in the top ten startup ecosystems in the world. To get there we will build on our existing network of incubators, accelerators and knowledge hubs.

State governments also provide various funding opportunities. Some existing funding opportunities are:

4.3.1 NSW Smart Places and Spaces Acceleration Program

The **Smart Places and Spaces Acceleration Program** is part of the NSW Smart Places and Spaces Strategy. The NSW Department of Planning, Industry and Environment (DPIE) defines smart places as "where the physical and digital environments converge. They integrate technologies into the built environment to capture and convey data and insights."

The Acceleration Program commits \$45 million in funding under the Digital Restart Fund to support the growth of smart places and spaces. The Program was officially launched by Minister Dominello in 2021 and provides 3 years of funding. Some projects pre-launched in 2020. The program aims to:

- Support economic and community recovery post COVID-19

- Encourage partnerships with co-investment from local councils and industry to deliver smart place initiatives
- Support advancement and implementation of the NSW Smart Places Strategy
- Ensure NSW remains the leading state in implementing Smart Places initiatives (DPIE Smart Places Acceleration Program)

4.3.2 NSW Digital Restart Fund

The **Digital Restart Fund**, legislated in 2019, provides funding of \$1.6 billion over three years to invest in digital transformation projects. The fund is administered by the Department of Customer Service and prioritises “iterative, multidisciplinary approaches to planning, designing and developing digital services in NSW.” The NSW Digital Infrastructure Policy requires a minimum level of smart technology in all new infrastructure in NSW (NSW Government 2020).

4.3.3 Victoria Gigabit State

Part of the \$626 million Victoria’s Digital Future Now strategy, the **Gigabit State** program, offers \$250 million to co-fund business-grade broadband connectivity for regional and suburban areas. The program is delivered in partnership with the Commonwealth government and was announced as part of the Victorian Budget 2020/21.

4.3.4 Policy Alignment

Creating smart and sustainable places has received attention from policy makers at all levels of government. The complimentary nature of the Australian Government’s Smart City and Suburbs Program, the Australia 2030: Prosperity through Innovation, NSW’s Smart Places Strategy, and the Victorian Gigabit State plan, among others, ensures significant support for the creation of smart and sustainable places.

4.3.5 Public-Private Partnerships

Partnerships between private corporations and governments is a well-established practice of funding smart city projects. Public-private partnerships are considered beneficial because they open a market for the private investor while providing government with support it would otherwise not have access to. As noted above, transport is a significant focus of public-private partnerships.

4.3.6 Case Study: Western Sydney Parkland City

One of the largest markets for investment in smart technologies is the Western Sydney Parkland City. The City is being developed to be one of Australia’s most connected cities, with cutting edge digital infrastructure, innovative transport services, and aviation, connecting residents to more jobs, services, education and the world (DPIE 2021).

As one of the fastest growing areas in Australia, and the site of the future Western Sydney Airport, Western Sydney will continue to attract significant public and private investment around the Aerotropolis. The Parkland City spans the local government areas of the Blue Mountains, Camden, Campbelltown, Fairfield, Hawkesbury, Liverpool, Penrith and Wollondilly. Funded by the Western Sydney City Deal, the precinct is an example of the commitment of the three levels of government – Federal, State, and the 8 local councils – to developing smart and innovative places and economies.

There is a broad digital vision for the area, which contends that the region's full potential will be reached with the creation of:

- an **inclusive and digitally capable** region, where people are the focus and everyone has access to technologies that benefit and create opportunities;
- a **productive** region with flexible, future-focused communication infrastructure for faster, more reliable and affordable digital connectivity;
- a **resilient and sustainable** region that uses technology to help manage natural resources efficiently; and
- a **liveable region**, where smart solutions improve the quality of the local environment and the health and wellbeing of the people in it (DPIE 2021)

The City Deal contains four digital commitments to enable the digital vision:

- **Western Parkland City Digital Action Plan**
- **Smart Western City Program**
- **5G strategy and trials**
- **Openly available data sets**

The Digital Action Plan sets out the required actions necessary to deliver the digital commitments and vision. This includes:

- digital initiatives and actions to support and enable Western Sydney Parkland City to become Australia's first digitally-enabled smart city;
- how government will address the barriers to collaboration, defining processes that will make teamwork effective and cut duplication; and
- a roadmap of actions to guide successful implementation of the Digital Action Plan (DPIE 2021)

The NSW Government-led Smart Western City Program identifies the smart place initiatives and solutions that are needed to enable digital connectivity. The Program is informed by 4 themes:

- **Internet connectivity** – fibre and mobile connectivity and Internet of Things networks to make smart places possible.
- **Smart monitoring** – environmental sensing and real time monitoring of infrastructure and public spaces.
- **Data sharing** – ways to house, secure, de-identify and protect data and make it open and available.
- **Smart planning and management** – digital resources for planning, delivering, operating and maintaining assets and places (like digital twins) (DPIE 2021)

The Program is expected to deliver smart public spaces, Smart transport services, increased community engagement and job growth.

The 5G strategy and trials are central to achieving the City's vision of digital connectivity through the provision of reliable and affordable internet connections that will boost the economy and liveability of the region. The Strategy aims to deliver on the following outcomes:

- Connectivity
- Meeting citizen needs and expectations
- Ensuring good urban amenity outcomes
- Ensuring 5G can be implemented in a commercially sustainable way, and
- Accelerating the value of 5G for the economy (DPIE 2021)

Finally, the openly available data sets will allow greater and secure access to data which will help the region achieve its ambitions by enabling the use of data to manage, monitor, plan and problem solve for the future City. The NSW Government data management platforms will be used to store shared data and will:

- Allow different groups of people to have secure access, so data is shared appropriately and no one has access to data they shouldn't.
- Are protected using NSW Cyber Security provisions.
- Can be accessed by local councils, so they can upload and maintain data.
- Link automatically to Commonwealth data sharing platforms, Data.Gov and NationalMap (DPIE 2021)

Continued investment from the three levels of government as well as industry will ensure the Parkland City will fulfil its ambitions of digital connectivity to bring the region closer to world. The City is likely to remain a significant site for trialling and investing in smart city technologies, economic growth and innovation.

5 Smart Cities in Australia in Overview

Australian cities have been using technologies and systems that can be considered smart for some time; however it was not until the mid 2010s that this use coalesced around the term, 'smart cities.' Discussion of smart cities accelerated with the National Innovation Agenda in 2015 but the key event in their rise was the launch of the national Smart Cities Plan in 2016 in which smart city projects would be funded and delivered through multi-level City Deals (Dowling, et al 2019).

Australian smart cities are diverse in theme, applications, models, governance and geography. Not all cities are at the same stage of smart city development. Early adopters included Newcastle, Adelaide, Melbourne, Townsville and the Sunshine Coast. More recently other cities have formalized smart city plans, such as the City of Sydney, or taken a broader inclusive approach to innovative cities. The Smart Cities and Suburbs Program has funded 81 projects.

Importantly, the geography of Australia plays a key role in the development of Australian smart cities with needs, funding and accessibility determined by the size and location of the city.

5.1 SMART CITY CONTEXT IN LARGE CITIES

5.1.1 Summary

Local governments are critical to the rollout of smart cities in Australia. A 2019 study of the largest cities of Melbourne and Sydney found that over two thirds (54 of the 69) of local authorities have explicitly engaged with one or more of smart city thinking, technologies or initiatives (Dowling, McGuirk and Gillon 2019). More than 200 smart city initiatives were identified, ranging across the spectrum from small-scale installation of sensing technology, for example to provide parking information, to larger-scaled precinct transformation projects. The distribution of these initiatives across smart domains and smart technologies are shown in Figures 1 and 2.

- Smart governance initiatives involving the digital transformation of government services were most common
- Approximately one quarter of all smart initiatives in metropolitan Sydney and Melbourne focused on smart living (58 of 234; 25 percent). Smart living initiatives deliver digital infrastructure such as free wi-fi in public space;
- Smart mobility initiatives that target technology-enabled infrastructure to deliver, or support the delivery of, new public and private transport modes comprised one-fifth of smart city activity in Sydney and Melbourne, centred on parking management
- Smart environment initiatives that apply technology to better use, manage, and regulate finite resources captured 17 percent of initiatives

Technologies used in the above ranged across digital infrastructure (30 percent), sensor technologies (24 percent), apps, websites, and open data.

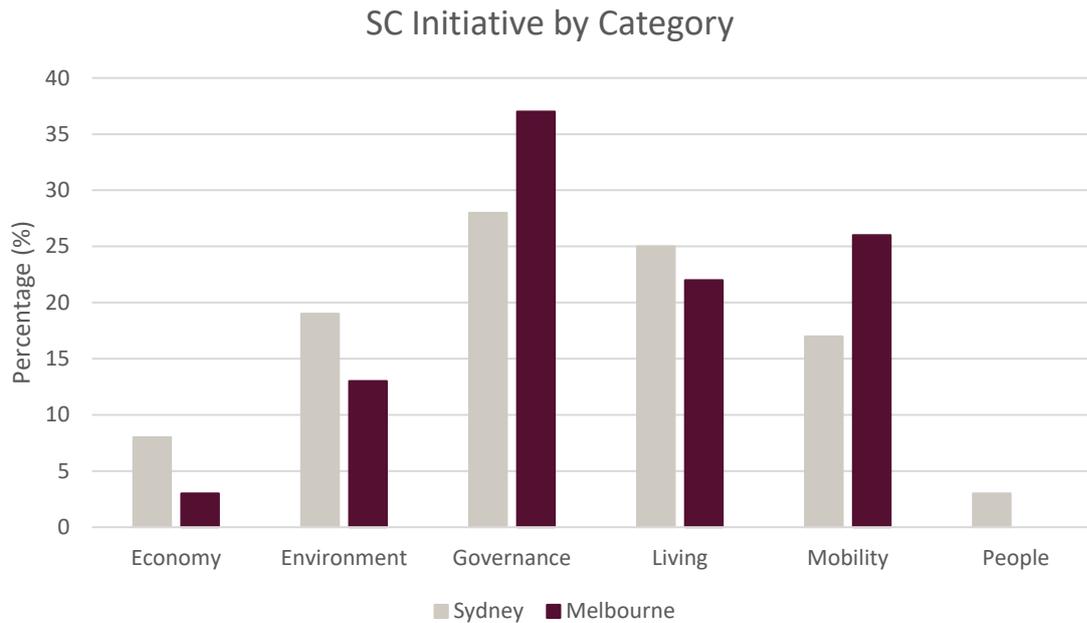


Figure 1 Smart City Initiative by Category. Source: Dowling, McGuirk and Gillon (2019).

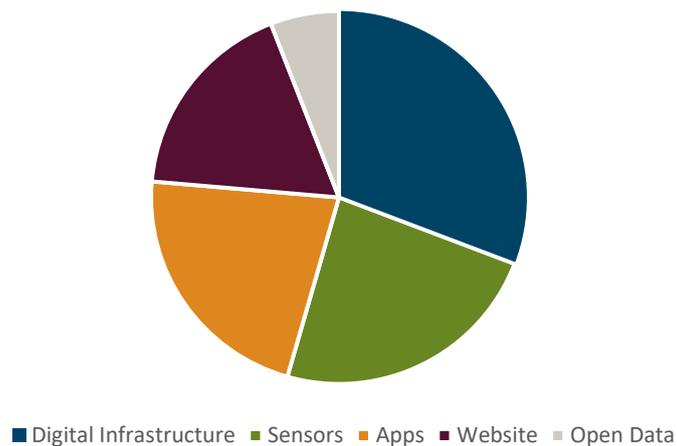


Figure 2 Technologies of Smart Cities in Sydney and Melbourne. Source: Dowling, McGuirk and Gillon(2019).

5.1.2 Identified Priorities

A survey of local governments conducted by the Australian Government in 2019 identified important drivers of the transition to a smart city. These were: to improve council service delivery, make the city more liveable, e.g. attractive, save operating costs, and create new industries and local jobs (Australian Government n.d.a). This informs our selection of 4 key areas:

- Smart Governance
- Smart Mobility
- Smart Spaces and Places
- Innovation Districts and the innovation and knowledge economy

The first three – smart governance, smart mobility, and smart spaces and places – broadly fit under the umbrella of improved service delivery, increased efficiency and increased liveability as identified in the survey. Innovation districts and the knowledge economy are primarily related to the survey's identification of industry and job creation. We elaborate on these 4 key priorities below.

6 Opportunity Landscape in Specific Smart City Domains

6.1 SMART GOVERNANCE

This is a key opportunity in the smart city space. Most smart city focus has been on e-governance. Moreover, according to Austrade:

The Australian Government is a technology early adopter. The United Nations E-Government Development Index (EGDI)² ranked Australia fifth out of 193 governments in 2020. Putting government services online typically increases the efficiency of interactions between businesses, individuals and government departments. For example, Australia's centralised online government service, myGov, brings health, tax and welfare interactions into one portal (Austrade 2021).

Underpinning e-governance is the idea that digital technologies can help cities, businesses, and service providers to better know, manage and respond to the city due to the enhanced data collection and analysis that digital technologies and platforms provide. App and web development, UX/UI Design, data visualization and cognate fields remain opportunities here.

6.2 SMART MOBILITY

Transition to a smart or intelligent mobility system is critical to Australia's digital ambitions and is being activated at all levels of government (Austrade 2018). Individual cities are trialing smart poles, new parking apps and electric charging infrastructure. All states have laid plans for transport provision and infrastructure to become smart over the next ten years. Federally, transport infrastructure is a key focus of large-scale investment, almost all of which will be digitally led (Australian Government n.d.b). Specific opportunities relate to:

- Smart roadways – tolling, traffic monitoring, leveraging Australia's world-leading and innovative SCATS system (scats.nsw.gov.au) that monitors and adjusts traffic flows in real time
- Smart ticketing – with recent opportunities exploring integration across modes – public transport, rideshare, mobility as a service
- Mobility as a service – providing door-to-door, on demand transport options that exist beyond conventional public and private transport. The challenge for smart cities in Australia is to develop seamless payment systems, networks and systems that provide on-demand performance using real time information. Artificial intelligence and machine learning will be critical
- Connected and autonomous vehicles (CAVs) – Australia no longer manufactures passenger or freight vehicles. Cities are, however, focused on implementing CAVs across its cities. There is a focus on shared passenger vehicles, especially in NSW where there are a number of trials underway (Transport NSW 2021; Department of Infrastructure, Transport, Regional Development and Communications, n.d.b)

Trials include the NSW Smart Shuttle at Olympic park, which along with Transport NSW and RMS (Roads and Maritime Services) partners with HMI Technologies, Telstra, NRMA Motoring and Services, Sydney Olympic Park Authority, General Insurer IAG and UTS. Partnerships between industry, research and academia are common in these spaces.

6.3 SMART SPACES AND PLACES:

Australian smart cities are increasingly focused on smart places – the digital reconfiguration of the city and its services. To quote the Department of Planning, Industry and Engagement, NSW, 'Smart Places bring the physical and digital together, meaning citizens, businesses, partners and the public service workforce can go Beyond Digital from local streets and suburbs in our regional and metropolitan areas as well as our cities'.

In Australia, making spaces and places smart is emerging as using technology to increase sustainability, social and economic activity, and improve health and well-being.

An example of this is smart street furniture. In order to combat high temperatures exacerbated by the urban heat island effect, some councils are looking to smart street furniture as a way to combat the effects of climate on public space and which are also of use to the public. An example of this is the Georges River Council's CHILLOUT Hubs – open-air public IoT enabled and accessible rest and play areas, which provide WiFi and mobile phone charging, allowing for flexible use. The hubs are also embedded with sensors to collect environmental data that can help Council to inform their environmental policy and better plan for a changing climate. The hubs are a collaboration between the Council, researchers at UNSW and Street Furniture Australia.

6.3.1 Smart Environment:

Technology is being used to create more sustainable and energy efficient places. Technologies and systems that allow data collection and analysis, monitoring and forecasting, visualisation of data in real-time and increase efficiency of processes, are examples of such applications. This includes:

- Smart energy applications: this includes smart metering and access to consumption use in real-time, allowing customers to make informed decisions on managing their resource consumption
- Data collection and analysis technologies that enhance monitoring of environmental conditions including in real-time and which contribute to more accurate forecasting
- Technologies which reduce waste and emissions by optimising service provision and reduce carbon emissions.
- Monitoring assets over their life-course to optimise use and encourage adaption and re-use, reducing carbon emissions
- Embedding environmental sensors in infrastructure to accelerate the collection and analysis, monitoring, and forecasting of environmental conditions which will enable better planning (DPIE 2021)

An example is the use of smart LED lights used in the City of Melbourne and supplied by Sylvania Schreder. The lights can both reduce energy consumption and be connected to provide additional environmental data such as noise and air quality with the use of sensors. Technology can also help to increase resilience to extreme weather events. Logan City in Queensland, has introduced the **Flooded Roads Smart Warning System (FRSWS) project**, which minimises the risk of driving into flooded roads with the use of advanced warning systems. The council worked with Griffith University and Substation 33 to deliver the technology.

6.3.2 Smart and Safe Places for Everyone:

Enhanced safety has been a key driver of smart city adoption in Australia. For example, The City of Newcastle's smart city journey emerged from a need to create a safer night-time economy (Dowling et al 2019). Smart CCTV, smart lighting and a network of communication infrastructure that better allows first responders to coordinate responses and share information, are examples of the types of systems being adopted.

Technologies for smart and safe places should increase people's sense of safety and resilience in response to threats, whether these are human or environmental. A greater sense of safety and resilience is associated with increased participation in social and economic activities (DPIE 2021).

A smart place is also inclusive, accessible and equitable, accommodating everyone regardless of ability or background. This includes both physical and digital accessibility. Achieving this means improving access to fixed and wireless internet across Australia including regional and rural areas. Opportunities have also been identified for smart solutions that can enhance social cohesion and develop a sense of community, while

recognising the important cultural and historical elements that give a space its unique characteristics (DPIE 2021). This includes:

- Smart placemaking technology that conveys important historical and cultural characteristics of places. This could include digital wayfinding.
- More and better-connected public spaces. Enhanced digital and physical connection will allow people to work and study in more places, widening access to education and employment opportunities (DPIE 2021).

The [Footscray Smart City for Social Cohesion Project](#) is an example of leveraging smart technology to produce inclusive smart places. The council has partnered with Victoria University, One Wi-Fi & Infrastructure, and Delos Delta to improve city performance and citizen experience through mechanisms such as smart environmental monitoring, smart mobility sensors, WiFi provision, touch screens for wayfinding and information, and smart lighting, to improve experience and provide data to make informed planning decisions.

6.3.3 Smart and Healthy Places

Environmental conditions influence health and well-being, particularly extreme weather events such as heatwaves, bushfires and air pollution. Significant interest is being directed towards start-ups and smart applications that enable better collection, analysis and monitoring of environmental data, that will help respond to emergencies, provide health services and better plan for healthy futures. Examples of ways in which smart solutions can contribute to smarter and healthier places include:

- Increased provision of e-health services through digital platforms and online consultations
- Use of data on mobility patterns to better plan for footpaths and bike lanes as part of broader efforts to encourage physical activity
- Environmental sensors and analytics that can better forecast extreme weather events and which can provide real-time data on environmental risk factors, helping emergency services and healthcare providers to better respond and prepare. This includes for example, preparing for heat related illness during heatwaves, and preparing to respond to respiratory issues when air quality is poor.

For example, in the wake of the devastating bushfires of 2020/21 interest has grown in remote monitoring systems that use internet and digital technologies to collect, analyse, and send automated fire warnings. For example, [researchers at the University of Adelaide](#) are developing monitoring systems that can be tailored to different communication mediums. Meanwhile, Australian company, [FireWatch Australia](#), has developed a digital, remote surveillance system that can monitor large regions 24/7 and enables early detection of bushfires.

6.3.4 Barriers

6.3.4.1 Climate

Australia experiences wide climate variability and extremes. Summer temperatures can be extreme with Penrith, in Western Sydney, registering as the hottest place on earth on the 4th January 2020 peaking at 48.9 degrees Celsius. In previous research, the authors note reports of sensors and smart technologies melting in the heat (Burgoyne and Maalsen 2017 unpublished).

6.3.4.2 Connectivity

Connectivity remains a key challenge. The digital divide between the urban and other parts of Australia means that the benefits of smart technologies are experienced unevenly. Providing digital equity is a priority.

6.4 INNOVATION ECONOMY AND STARTUPS

In Australia, smart cities are oriented around ‘innovation-led’ employment and growth. Digital technologies are playing a key role in urban economies, as they shift from manufacturing to innovation and knowledge economies. In Australia, this economic transformation is seen in strategic planning that targets the agglomeration of knowledge and startup sectors in the form of innovation districts.

The Australia 2030 Prosperity through Innovation Plan notes that well established innovation districts drive ‘disproportionate innovation, employment and economic growth’ (IISA 2017, 79). Such acceleration is attributed to the clustering of industries, workers, and infrastructure which in turn attracts additional entrepreneurs and opportunities (IISA 2017, 79).

Despite investment being funnelled towards cities, regional areas offer unique opportunities for innovation industries such as in ‘deep technology, agricultural and health technology, advanced manufacturing, and aeronautical technologies’ (Dowling et al 2020). Regional areas offer additional incentives such as generally more affordable housing and office markets, lifestyle, and amenity benefits. The governments ‘City Deals’ have supported the growth of innovation in some of these regional areas, such as Townsville, in Queensland, where the City is focused on growing innovation and entrepreneurship to drive economic growth, and strengthening their digital infrastructure to support city services; and Geelong in Victoria, which will use the support to introduce technologies that have benefits for business and residents, grow the visitor economy and continue the city’s economic diversification.

6.4.1 Key Barriers: Connectivity

Barriers to innovation districts meeting their full potential have been identified. These include a range of factors from connectivity, to wages, to retention of talent and workers, and inflexible governance.

The two key factors impacting on the development of innovation districts are digital and physical connectivity. Digital and physical connectivity are critical to the success of innovation districts and means connectivity in terms of commuting and accessing the site as well as being digitally connected (Dowling et al 2020, 40). Poor transport infrastructure and a subsequent reliance on the private car were found to negatively impact on innovation districts making it more difficult for people to commute with ease and efficiency.

Additionally, poor digital connectivity impacted by a fractured National Broadband Network (NBN) roll out, and a subsequent uneven provision of quality communications infrastructure, also presents challenges to the growth and success of Australian innovation districts (Dowling et al 2020, 36). The NBN’s problem roll out was largely the result of politicisation which has seen it change from a promised fibre network intended to cover 93 percent of Australia, to a patchwork of technologies producing different speeds and quality of service nationwide (Alizadeh and Farid 2017). Accessing reliable and fast internet is critical to the startup and innovation economy. The success of developments such as the Tonsley Innovation District in South Australia, is due to the significant investment in infrastructure which has provided reliable and fast digital connectivity, and reliable transport options to other knowledge hubs, housing and the Adelaide CBD.

6.4.2 Opportunities

6.4.2.1 Appetite for innovation

There is a strong appetite for supporting the growth of the knowledge and innovation economy at all levels of government as demonstrated by the policies and initiatives discussed above. Many cities and regions are in a phase of economic transition from mining and manufacturing towards the knowledge economy and this is driving the prioritization of this shift and the emergence of innovation districts.

6.4.2.2 Ecosystem of connectivity

Connectivity is crucial to the success of innovation and knowledge economies but the provision of and access to this infrastructure is experienced unevenly across Australia. There is an opportunity for services, products and technologies that can provide a diverse range of connectivity options – such as network options beyond broadband – to create a more connected ecosystem.

6.4.3 Case Study: Tonsley Innovation District

The Tonsley Innovation District (TID) is located on the site of a former Mitsubishi manufacturing plant, which was bought and repurposed by the Government of South Australia in 2010. It was repurposed by the South Australian government as an advanced manufacturing and innovation district, helping to boost the economy and employment and underpinned by gigabyte broadband as part of the State's 'Gig City' program.

The site now includes advanced manufacturing with over 1700 employees spread across different sized tenancies, co-working spaces and larger allotments that home Siemens Energy and Hydrogen Park SA (TID n.d a) The site also hosts TAFE SA and innovation and research groups from Flinders University, bringing 8,000 students through the site each year (Tonsley n.d a) and leveraging the potential for innovation through proximity. Tonsley focuses on four key sectors which speak to South Australia's economic strengths and opportunities. These are:

- Cleantech and renewable energy
- Health, medical, devices and assistive technologies
- Mining and energy services
- Automation, software and simulation

South Australia is one of the nation's leaders in renewable energy adoption and is also making strides in cleantech. This success is underpinned by the State's policy and regulatory frameworks that support investment in these areas (TID n.d. b).

As an innovation district with direct links to the University and research sector, Tonsley plays a pivotal role in facilitating connections between companies, researchers, policy makers, funding and grant programs and market opportunities that drive innovation in the medical devices and assistive technologies sectors (TID n.d. c). The site's proximity to key medical facilities, health research institutions, companies and medical facilities, is a key drawcard for those who wish to develop, test, commercialise and manufacture products in the assistive technology and medical device sector (TID n.d. c).

As a globally significant region for minerals and energy resources, there is considerable government support to connect local companies with projects and to invest in high value manufacturing industries that have applications to the mining sector and vice versa. This includes a broad cross section of industries from fabrication, design and engineering, among others, to remote mining technology, unconventional gas and petroleum industries services, and automation and precision engineering (TID n.d. d).

The site also attracts key businesses in automation, simulation and software technologies which have broad applications across sectors including from manufacturing to health, from energy to building and construction. Tonsley has seen a growth of businesses in this area, which have led to networks and new business opportunities within and beyond the site (TID n.d. e).

7 Smart City Context in Small Cities and Regional Centers

7.1 SUMMARY

The needs, possibilities, and conceptualization of the 'smart city' in regional Australia are different from urban centers. Large global corporations like Cisco trialled their smart city developments in regional rather than metropolitan locations (Burgoyne and Maalsen 2017). As Schifferle notes,

Regional towns and communities are inherently different to cities. Residents have different ways of working, living and moving around communities; and they have different values and thrive in a different cultural norm.... Seeking to implement the traditional components of a smart city in the regional context is a monumental task (Schifferle 2021, n.p.).

Yet the prospects for innovation and smart city development in regional Australia remain strong. Imogen Schifferle, the Innovation and Regional Partnerships Coordinator at the City of Albury Wodonga, notes how the Ovens Murray and Riverina Murray regions which expand over 180,000 square kilometres, have leveraged the conditions of their self-containment to rapidly transform and implement reforms that have generated a 'culture of innovative thought patterns and short-term problem solving' (Schifferle 2021, n.p.). The region is working towards improving digital connectivity, with 'access as a service' offered by a planned IoT network across six LGAs and four shires, and 'high-speed regional hub-and-spoke data centers' to provide the computational speeds required to support:

- critical transport corridors with the capacity for M2M (machine-to-machine) logistics
- automation and growth of AI in primary industry
- eventual growth of investment in high-speed business parks
- Enhanced connectivity to support emergency services through connected incident pathways
- improved health care service delivery and accessibility for vulnerable communities and digital applications in the agriculture and horticulture belts (Schifferle 2021)

Regional centers also have the capacity to be world-leading smart cities. Townsville, Queensland, was recently named as one of the SMART21 Communities of 2021 by the Intelligent Community Forum (ICF) for the Intelligent Community Awards Program (Booth, 2021) Townsville's decade long commitment to its smart city implantation has resulted in city focused on innovative collaboration. Smart Precinct NQ – a not for profit organisation focused on growing innovation and entrepreneurial activity in Townsville and its regions, is a good example. Smart Precinct has facilitated collaboration between James Cook University, local government, industry, and the start-up community to drive forward innovation in the city (Booth 2021). The City of Townsville recognises that enhancing connectivity, growing skills in ICT and harnessing the potential of big data, is key to the City's aims to increase environmental sustainability, achieve digital equality, and generate opportunities for future industries (Booth 2021).

7.2 CASE STUDY: SUNSHINE COAST COUNCIL

Another regional city that is a world leader in smart cities is the Sunshine Coast Council who have made significant investments in smart infrastructure.

The Sunshine Coast Council (SCC) is a regional council situated in South East Queensland. The council has established its **Smart City Framework** in 2016 which has helped guide council to develop their digital capacity and capabilities as a region. The SCF provide the policy framework for an initial three-year implementation plan which has provided foundational infrastructure across the region (SCC 2021a).

In November 2020, the council has signed a development agreement with SunCentral Maroochy Pty Ltd and developer, Walker Corporation, to start to build the smart city center that is part of the region's broader smart city plans. SCC is in the rare position of having a 53 hectare greenfield site to develop a smart city from scratch. The development is central to the Council's plans to strengthen the region, drive growth and create a vibrant city (SCC 2021b)

Smart city technologies that are part of the development include a high-speed fibre optic network will be installed as underground infrastructure and which will support city wide free WiFi, smart signage, smart parking apps, and energy saving LED lighting. Initiatives also run to the delivery of services such as automated waste collection and the CBDs energy will be provided through Council's own Sunshine Coast Solar Farm (SCC 2020). Other current initiatives include network flood sensors, the digital mapping of public pathways, pedestrian and cyclist counters, digital touch screen kiosks, and a dog leash app which lets owners know where and when they can walk their dog offleash (SCC 2020).

SCC's smart capacities and capabilities are also underpinned by a major broadband infrastructure investment, driven by the Mayor. The Sunshine Coast International Broadband Network project is Queensland's first direct international data and telecommunications connection to global markets. The network provides the fastest international connection in east Australia to Asia (SCC 2021b).

SCC has shown significant leadership in implementing smart city initiatives, programs, and technologies. Strong leadership and a desire to revitalise the region have helped to drive these programs forward. This includes the in progress and future development projects such as the Mass Transit Project, which will require smart technologies and infrastructure. With a predicated population growth of over 200,000 new residents in 20 years, the region is looking to digital technologies to support service delivery, improve sustainability and drive the economy. The region is a likely to be a key site of smart technology investment.

7.3 IDENTIFIED PRIORITIES

The four key priority areas identified for cities in section 6 above are also applicable to smaller cities and regional centers, which are likewise interested in improved service delivery, increased efficiency and increased liveability, as well as having a demonstrated interest in identifying and supporting future industries and applying cutting edge technologies to primary industries. Rather than address the four key areas again, in this section we identify an additional priority specific to regional and rural areas which is a key opportunity for smart technology, namely smart agriculture and agricultural technology (AgTech).

While it might seem unorthodox to include smart agriculture when talking about smart cities, its inclusion is important for multiple reasons. Australia has always been at the cutting edge of agriculture practices and significant investment from both government and industry is directed towards AgTech. Developing and trialling these technologies in agricultural contexts means that the technologies must be robust enough to meet the climatic and connectivity demands of regional and rural Australia and can be applied elsewhere. As such, AgTech is a key market for smart tech.

7.4 SMART AGRICULTURE

Agriculture is a major component of the Australian economy, contributing \$60 billion 2018-2019, and Australia is the sixth largest producer of food in the world (ABS 2021; ATIC 2019) Australia has a long history of being at the forefront of innovation in agriculture and our leading edge in agricultural innovation is supported by investment in research and industry. A parliamentary inquiry into 'smart farming' and innovation in agriculture highlighted the role that new technologies will play in ensuring the agricultural sector retains its competitive edge. Individual farm businesses that decide to adopt new technologies will play a key role in growing innovation in the agriculture sector however it is crucial that government supports this technology adoption (Commonwealth Government of Australia 2016, vii).

Transformative technologies have been identified as one of five megatrends impacting the future of Australia agriculture. This includes advances in digital technology, genetic science and synthetics (Commonwealth Government of Australia 2016, 27). Emergent technologies in biological science, materials science, seasonal forecasting and digital science will have implications for the agriculture sector (Commonwealth Government of Australia 2016, 31). In particular, it is noted that agricultural productivity can be increased by the Internet

of Things ecosystem, including sensors for data collection, data storage and management and data analysis (Commonwealth Government of Australia 2016, 33). For example, managing water is key to farming in Australia, particularly in drought prone regions. Western Australian company, **Swan Systems**, addresses this problem through water and nutrient management software that allows farmers to make data-driven decisions around when to irrigate and optimise water usage.

However, the benefits that technology can offer to the agriculture sector must be supported by the provision of reliable and accessible infrastructure, regulatory mechanisms, and markets, but there are key barriers to achieving this. These are limited connectivity, a lack of skills and regulatory barriers.

7.4.1 Key Barriers and Challenges

7.4.1.1 Connectivity

A lack of reliable internet access and telecommunications networks are a major barrier to the growth of smart farming. The Inquiry into smart farming noted unreliable and limited access to telecommunications services as a 'fundamental barrier to agricultural innovation and the adoption of emerging technology' (Commonwealth Government of Australia 2016, 50). The telecommunications infrastructure of regional, rural, and remote Australia is fragmented, unreliable, and struggling to meet increased demands. In many rural and remote areas, fixed-line internet services are unavailable to farms. The NBN is supposed to address this gap with a mix of fixed-line and fixed wireless technologies and satellite when these aren't feasible however the roll-out has not been smooth. Additionally, the Interim Satellite Service which was part of the 2011 NBN roll out is unable to meet increased usage demand.

As a result of the limited access to fixed-line internet, farmers are increasingly accessing the internet via mobile networks. While mobile does offer some access options, it was noted that there remain ongoing problems with mobile blackspots, network reliability, and limited bandwidth along with limited access to 4 and 5G as presenting challenges to smart technology adoption (Commonwealth Government of Australia 2016, 44-45). In turn, this is limiting the ability of farmers to adopt new technologies and is impacting on productivity.

Reliable access to telecommunications and ICT was identified as critical to the adoption of smart farming technologies and capacity for data collection and analysis across several areas (Commonwealth Government of Australia 2016, 39-40).

- Remote control and automation of farm equipment
- Precision or spatially-enabled agriculture
- Monitoring and remote sensing
- Data services

7.4.1.1.1 Alternative Connectivity Options

Alternative connectivity options are being added to the existing telecommunications and internet infrastructure to improve connectivity. These include 'small cell' technologies that can provide data connectivity from 50-200m, seen as a viable option in small towns with a low population for which a commercial mobile tower would not be seen as feasible (Commonwealth Government of Australia 2016, 46). CSIRO was also developing Ngara, a wireless technology, which uses spectrum to provide connectivity to areas with a lack of telecommunications infrastructure and a small population (Commonwealth Government of Australia 2016, 46).

Improving telecommunications infrastructure and connectivity to information and communications technologies is a priority investment area.

7.4.1.2 Skill shortage

Skilled labour is difficult to access in regional, rural and remote agricultural areas (Commonwealth Government of Australia 2016, 60). This is seen as a two-way process with those who want to gain skills struggling to acquire them because of limited training delivery and accessible content (Commonwealth Government of Australia 2016, 62). The Inquiry identified the need for more people with advanced technological skills to help translate technologies to end users, closer collaboration between organisations during the R&D process, and an upskilling of both researchers and workers, as required to support the sector (Commonwealth Government of Australia 2016, vii-viii).

It is also noted that unskilled labour is difficult to attract, and this has led to a focus on automation technologies with robotic and automation technologies identified as a key area of investment in replacing manual labour used for repetitive tasks (Commonwealth Government of Australia 2016, 61).

Considering the increasing digitalization and adoption of technology in the agriculture sector now and in the future, there is a need for increased investment in the education of agricultural workers and graduates (Commonwealth Government of Australia 2016, 65). The provision of innovative education strategies for the agriculture sector is a priority (Commonwealth Government of Australia 2016, 77).

7.4.1.3 Regulation

New and innovative products necessarily need to be regulated to increase confidence in products and continued investment. Agriculture and veterinary chemicals, gene technology, and the use of drones – unmanned aerial vehicles (UAVs) – were all areas for concern. A more consistent approach to regulation and which balanced the need for safety and confidence while reducing inefficiencies and regulatory burdens was identified as necessary for growing innovation in the agriculture sector (Commonwealth Government of Australia 2016, 99-100).

Drones and surveillance technologies have been increasingly used to monitor stock, crops and pasture. However, there are issues with UAVs including air safety and privacy and a belief that technology is evolving faster than the regulations that govern its use (Commonwealth Government of Australia 2016, 114). Some of the benefits of using these technologies in rural and remote areas are limited by regulations that are in place for more densely populated areas yet there is also a need for better understanding of the appropriate use of drones in the agriculture industry. In response to this, the committee identified a need for the Department of Agriculture and Water Resources and the Civil Aviation Safety Authority to develop resources that promote appropriate uses of drones (Commonwealth Government of Australia 2016, 114).

7.4.2 Key Opportunities

7.4.2.1 Culture of Innovation:

Australian farmers have a demonstrated commitment to innovation in agriculture. There is a strong problem-solving culture, sense of purpose and a desire to generate high-quality and cost-effective produce (Commonwealth Government of Australia 2016, 116). There is a vast array of emerging technologies that will help farmers by performing complex tasks, enhancing data collection and analysis and making supply chains more efficient. The National Broadband Network (NBN) is recognized as central to facilitating the uptake of technology.

8 Key Opportunities and Key Challenges

8.1 OPPORTUNITIES

Australia offers opportunities for smart and innovative technology investment at the urban, metropolitan, regional and rural levels. Australia's innovation economy is prioritized at all levels of government and in many of our key industries ranging from the knowledge sector, to agriculture. Table 1 identifies some of the key opportunities that are underpinning investment in smart technologies.

Table 1 Key Opportunities

Key Opportunities
Transitioning from mining and manufacturing to knowledge economy and advanced manufacturing
Investment priority for all levels of government
Appetite for innovation
Industry diversity
Existing and emerging smart cities

8.2 CHALLENGES

Many of the obstacles encountered by governments and cities transitioning to 'smart' are financial and socio-cultural. By this, we mean that it is not the technology itself but having the necessary resources – funding, relevant skill sets, and leadership – that present the biggest challenges.

Research by KPMG shows that finding adequate funding was the key challenge identified by smart cities in 2019 compared to a lack of clear leadership which was the main challenge identified in 2018 (KPMG 2019, 9). Across 2018 and 2019 however, the three top challenges remained the same: financial, lack of clear leadership and the availability of resources (KPMG 2019, 9). Other notable areas that presented challenges to becoming a smart city were the availability of resources, a lack of clarity of where to begin, access to the necessary skills and resources, procurement, broader policy challenges and cyber security issues (KPMG 2019, 9). KPMG notes that being able to have people with the requisite skill sets will become increasingly challenging as technology develops and has noted the need for upskilling programs (KPMG 2019, 9).

Perhaps the most significant challenge, however, remains the provision of reliable connectivity and infrastructure. A parliamentary inquiry on Smart Cities, reported that making Australian cities 'smarter' required:

- a connection to fast and reliable internet
- growth of IoT technologies,
- mechanisms to safeguard the interoperability of IoT technologies;
- and a transition to open data

[Parliament of the Commonwealth of Australia 2018, 252]

As identified in section 6, current gaps in the infrastructural networks are key barriers to the smart city. Table 2 below outlines some of the key challenges identified for the implementation of smart technologies.

Table 2 Key Challenges

Key Challenges
Connectivity and infrastructure
Skill shortages
Size and lack of density especially in regional areas
Weather extremes
Remoteness
Regulation
Affordability challenges: high cost of housing and living
Interoperability
Access to resources
Finance
Cybersecurity

8.3 STAKEHOLDERS

There are many actors in the Australian smart city landscape. Key stakeholders are listed below alphabetically (Table 3). This is not a comprehensive but rather lists those most relevant to the above content.

Table 3 Key Stakeholders

Stakeholder	Details
AgriFutures Australia	https://www.agrifutures.com.au
Ag Institute of Australia	http://www.aginstitute.com.au
AusBiotech	https://www.ausbiotech.org
Australian Local Government Association	https://alga.asn.au
CSIRO	https://www.csiro.au/en/
Dept. of Industry, Science, Energy and Resources	https://www.industry.gov.au/topic/policies-and-initiatives#industry-innovation-and-science
Dept. of Infrastructure, Transport, Regional Development and Communications	https://www.infrastructure.gov.au/cities/smart-cities/communities-of-practice/index.aspx
Industry Innovation and Science Australia	https://www.industry.gov.au/policies-and-initiatives/industry-innovation-and-science-australia
NBN	https://www.nbnco.com.au
NSW Dept of Planning, Industry and Environment	https://www.dpie.nsw.gov.au
Smart Cities	https://smart-cities.com.au
Smart Cities Council Australia and New Zealand	https://anz.smartcitiescouncil.com

9 Conclusion and recommendations

Australia offers a broad range of opportunities for the application of smart city technologies. Cities of all sizes and regions are looking to smart technologies to improve service delivery, increase efficiency, improve sustainability and make them more liveable. At the same time there are a host of geographical, environmental, infrastructural, and financial challenges, for successful implementation. Significant investment across all three levels of government and private industry is however attempting to address these issues.

Broadly there are market opportunities for companies involved in but not limited to the following:

- Network connectivity: technologies and interventions that can diversify and strengthen internet and telecommunications infrastructure.
- Energy: smart and sustainable energy technologies and cleantech
- IoT
- Automation, software, and simulation
- Innovation and knowledge economy: services, products and technologies that can drive the innovation sector and knowledge economy
- Medical devices and assistive technologies
- E-health
- Future mobility trends including AVs and EVs
- Smart street infrastructure
- Advanced manufacturing
- Supply chain and logistics (particularly for agricultural produce)
- Waste: automated waste systems, recycling, and reuse.
- Environment: sensors, monitoring, and analytics technologies
- Safety and security: including safe public space
- Cybersecurity
- Interoperability of platforms
- AgTech

10 References

- ABS (2021) Value of Agricultural Commodities Produced, Australia. Available at: <https://www.abs.gov.au/statistics/industry/agriculture/value-agricultural-commodities-produced-australia/latest-release>
- Alizadeh, T. and Farid, R. (2017) Political economy of telecommunication infrastructure: An investigation of the National Broadband Network early roll out and pork barrel politics in Australia. *Telecommunications Policy*, 41(4), pp. 242-252. <https://doi.org/10.1016/j.telpol.2017.02.002>
- Austrade (2020) Why Australia Benchmark Report 2021. Available at: <https://www.austrade.gov.au/benchmark-report/strong-foundations>
- Austrade (2018) Intelligent Transport Systems. Available at: <https://www.austrade.gov.au/future-transport/intelligent-transport-systems/>
- Australian Government (n.d. a) Summary of Smart Cities, Towns and Regions in Australia Survey. Available at: <https://www.infrastructure.gov.au/cities/smart-cities/files/summary-smart-cities-towns-regions-australia-survey.pdf>
- Australian Government. (n.d.b) Building our Future. Available at: <https://buildingourfuture.gov.au/>
- Australian Trade and Investment Commission (ATIC) (2019) Agtech in Australia: Driving IOT connectivity for farming. Available at: <https://www.austrade.gov.au/news/success-stories/agtech-in-australia-driving-iot-connectivity-for-farming>
- Booth, E. (2021) \$90 million program improves rural digital connectivity. *Smart Cities*. Available at: https://smart-cities.com.au/90-million-program-improves-rural-digital-connectivity/?utm_source=Smart+Cities+-+News+List&utm_campaign=4bbcdd4966-Smart+Cities+enews+30/01/20_COPY_01&utm_medium=email&utm_term=0_52d1551fe6-4bbcdd4966-94184833&mc_cid=4bbcdd4966&mc_eid=0c4c766c34
- Booth, E. (2021) Four Australian cities named in world's top smart cities. *Smart Cities*. Available at: <https://smart-cities.com.au/four-australian-cities-named-in-worlds-top-smart-cities/>
- Burgoyne, S. and Maalsen, S. 2017. How Smart are Australian Cities? Available at: <https://www.ussc.edu.au/analysis/how-smart-are-australian-cities>
- Burgoyne, S. and Maalsen, S. 2017. Unpublished material collected during research for How Smart are Australian Cities? Available at: <https://www.ussc.edu.au/analysis/how-smart-are-australian-cities>
- City of Melbourne (2020) Economic impacts of COVID-19 on the City of Melbourne. Final Report. Available at: <https://www.melbourne.vic.gov.au/sitecollectiondocuments/economic-impacts-covid-19-report.pdf>
- Commonwealth Government of Australia (2016) Smart Farming: Inquiry into agricultural innovation, House of Representatives Standing Committee on Agriculture and Industry, Canberra.
- Department of Infrastructure, Transport, Regional Development and Communications, (n.d.a). City Deals. Available at: <https://www.infrastructure.gov.au/cities/city-deals/>
- Department of Infrastructure, Transport, Regional Development and Communications (n.d. b) The Office of Future Transport Policy. Available at: <https://www.infrastructure.gov.au/transport/land-transport-technology/office-of-future-transport-technology.aspx>

Dowling, R., Maalsen, S., Emmanuel, L. and Wolifson, P. (2020) Affordable housing in innovation-led employment strategies, AHURI Final Report No. 333, Australian Housing and Urban Research Institute Limited, Melbourne, <https://www.ahuri.edu.au/research/final-reports/333>, doi: 10.18408/ahuri-7320401.

Dowling, R., McGuirk, P. and Gillon, C. (2019). Strategic or Piecemeal? Smart City Initiatives in Sydney and Melbourne. *Urban Policy and Research*. 37(4), pp. 429-441. Doi: [10.1080/08111146.2019.1674647](https://doi.org/10.1080/08111146.2019.1674647)

Dowling, R., McGuirk, P. and Maalsen, S. (2019). Realising smart cities: Partnerships and economic development in the emergence and practices of smart in Newcastle, Australia. In Karvonen, A., Cugurullo, F. and Caprotti, F.(Eds.) *Inside Smart Cities*. London: Routledge.

DPIE (2021) Smart Places in Action – Programs. Available at <https://www.dpie.nsw.gov.au/our-work/strategy-and-reform/smart-places/Smart-Places-in-Action-Programs#Western%20Parkland%20City%20Digital%20Action%20Plan>

DPIE (2021) Introducing Smart Places. Available at <https://www.dpie.nsw.gov.au/our-work/strategy-and-reform/smart-places/smart-places-strategy/Introducing-Smart-Places>

Industry Innovation and Science Australia (IISA) (2017) Australia 2030: Prosperity through Innovation: A plan for Australia to thrive in the global innovation race. Australian Government, Department of Industry, Science, Energy and Resources.

KPMG (2019). Smart Cities: A snapshot of Australia in 2019. Available at: <https://assets.kpmg/content/dam/kpmg/au/pdf/2019/smart-cities-snapshot-of-australia-in-2019.pdf>

NSW Government (2016). Bringing Ideas to Life: NSW Innovation Strategy. Available at: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjW66f42ubwAhV2yDgGHSwuCJ8QFjAAegQICBAD&url=https%3A%2F%2Fwww.acs.org.au%2Fcontent%2Fdam%2Facs%2Fdocuments%2FNSW_Government_Innovation_Strategy_Document.pdf&usg=AOvVaw1ic9fF4UL5UJdFVTlkpAmx

NSW Government (2020). Smart Infrastructure Policy. Available at: <https://www.digital.nsw.gov.au/policy/smart-infrastructure-policy>

Parliament of the Commonwealth of Australia (2018) Building Up & Moving Out: Inquiry into the Australian Government's role in the development of cities. House of Representatives Standing Committee on Infrastructure, Transport and Cities, September 2018, Canberra

PWC (2018) CityPulse Sydney: Building three cities of the future. Available at: <https://www.pwc.com.au/agendas/cities/citypulse-sydney-building-three-cities-for-the-future-web.pdf>

Schifferle, I. (2021) An archetype for innovation in regional Australia. *Smart Cities*. Available at: https://smart-cities.com.au/an-archetype-for-innovation-in-regional-australia/?utm_source=Smart+Cities+-+News+List&utm_campaign=0650081348-Smart+Cities+enews+30/01/20_COPY_01&utm_medium=email&utm_term=0_52d1551fe6-0650081348-94184833&mc_cid=0650081348&mc_eid=0c4c766c34

Sunshine Coast Council (SCC) (2021a) Smart City Implementation Plan. Available at: <https://www.sunshinecoast.qld.gov.au/Council/Planning-and-Projects/Major-Regional-Projects/Smart-Cities/Smart-City-Implementation-Program>

Sunshine Coast Council (SCC) (2021b) Maroochydore City Centre Priority Development Area (PDA). Available at: <https://www.sunshinecoast.qld.gov.au/Council/Planning-and-Projects/Major-Regional-Projects/Maroochydore-City-Centre>

Sunshine Coast Council (SCC) (2020) Smart City Projects. Available at: <https://www.sunshinecoast.qld.gov.au/Council/Planning-and-Projects/Major-Regional-Projects/Smart-Cities/Smart-City-Projects>

TID (n.d. a) Vision. Available at: <https://tonsley.com.au/vision/>

TID (n.d. b) Clean tech and renewable energy. Available at: <https://tonsley.com.au/focus-sectors/cleantech-and-renewable-energy/>

TID (n.d. c) Health, medical devices and assistive technologies. Available at: <https://tonsley.com.au/focus-sectors/health-medical-devices-and-assistive-technologies/>

TID (n.d. d) Mining and energy services. Available at: <https://tonsley.com.au/focus-sectors/mining-and-energy-services/>

TID (n.d. e) Automation, software and simulation. Available at: <https://tonsley.com.au/focus-sectors/automation-software-simulation/>

Transport for NSW (2021). Projects: Autonomous vehicle trials. Available at: <https://www.transport.nsw.gov.au/projects/programs/smart-innovation-centre/projects>

AUSSENWIRTSCHAFT AUSTRIA

AUSSENWIRTSCHAFTSCENTER SYDNEY

Level 10/1 York street

2000 Sydney

T +61 2 92 47 85 81

E sydney@wko.at

W wko.at/aussenwirtschaft/au

