Leveraging digital development in regional and rural Queensland:

Policy Discussion Paper







Digital Media Research Centre



JUNE 2021

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"Queensland is a big state—and the only truly decentralised state in Australia, in which over half the population live outside of the capital city. We need to take a planned approach to build better connections and digital infrastructure for all our communities. This is not an easy problem to solve and it means we need to work with all tiers of government, communities and industry to deliver the best connection solutions for Queenslanders. Current solutions will not support the services

that our communities need, nor the connectivity required for our businesses to compete globally."

- DIGITAL1ST Strategy, Queensland Government.

Executive Summary

Digital connectivity and capability are essential for regional economic development in the 21st century. Key sectors such as agriculture, resources, energy, tourism, and health are undergoing dramatic transformation globally, and there are enormous opportunities for Queensland and Australia to leverage telecommunications and the internet to increase productivity, diversify industries, and access global markets. Never has digital connectivity been so important in improving livability and maintaining people and workforces in regional and rural communities.

The COVID-19 pandemic has highlighted and exacerbated some of the key challenges that regional and rural individuals, businesses, and communities face in accessing and participating in the digital economy. Universal access to fast, reliable, and affordable connections is still not a reality for many Queenslanders, and many people lack the advanced digital literacies and skills required to put digital technologies to work in life and business. Indeed, the digital divide between urban and rural areas is deepening, contributing to social and economic inequalities.

Rural and regional engagement with digital technology is mixed, with some people in key sectors, such as agriculture, struggling to keep up with fast-paced technological development. Local governments, particularly in remote areas, often lack the knowledge and capacity to drive digital development locally and to advocate for the technical solutions needed to better connect their communities. While the Commonwealth Government is working to deliver universal access, and the Queensland Government has several digital development policies and programs, regional and rural Queensland is lacking a cohesive vision and strategy to achieve digital transformation.

This discussion paper was developed through a literature review, consultations with key stakeholders in community and industry roles, a policy audit, and interviews with policy makers at three levels of government. The research findings conclude that there is an understanding for the need to support digital development, and a willingness amongst stakeholders to commit effort and resources. However, a more holistic and bold approach is required that prioritises and invests in both the hard infrastructure and the social infrastructure needed to achieve overall digital inclusion, social equality, and economic development.

The paper culminates in six recommendations for the Queensland Government to unify and accelerate its efforts to lead and support digital development in the regions:

- 1. Devise a clear overarching Queensland digital development policy that aligns with regional development priorities and combines connectivity, service support, and digital literacy issues.
- 2. Address the urban-rural digital divide with appropriate place-based analysis, planning, and solution building.
- 3. Strengthen cross-jurisdictional collaboration for policy and program development and streamline state-regional engagement.
- 4. Critically examine policy making across government in relation to post COVID-19 recovery for fair and equitable digital development.
- 5. Develop and fund strategies and programs that support more greatly embracing digital technologies in key industries and which grow digital literacy.
- 6. Fund targeted research to provide robust evidence for addressing industry and community needs, skills, and solutions for digital development.

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1. Introduction

Greater participation in the digital economy provides a major opportunity to diversify regional economies, develop improved global economic participation, improve workforce attraction and retention, and enable competitiveness. Moreover, deployment of digital infrastructure has significant non-economic impacts such as facilitating population settlement, improving service delivery, and enhancing livability and social connectivity. Key to this is high-speed digital connectivity, effective planning for access, and localised digital capabilities.

This Policy Discussion Paper explores key policy issues in increasing regional and rural Queensland's exposure to the digital economy. While Queenslanders are benefitting from improved digital infrastructure (such as the NBN), digital capability and literacy (at the individual and business levels) is emerging as an important factor impacting the state's ability to leverage digital technologies for economic and social development. Effective policy and programs will play an important role in developing a robust digital inclusion ecosystem in regional and rural Queensland.

Using a mixed method approach, this study involved an audit of current policy in relation to digital connectivity, development, and growth in regional and rural Queensland. Drawing on desktop-based research and discussions with key stakeholders, the study involved analysis of existing digital connectivity infrastructure, policy gaps, and options. This paper is designed to inform the Queensland Government and other stakeholders about planning for building digital infrastructure and digital capability in regional and rural Queensland.

The methodology for developing this Policy Discussion Paper was carried out in three phases:

- 1. **Literature review**: Reading of academic and grey literature about digital connectivity and development in regional and rural Australia and Queensland.
- 2. **Policy audit**: Collation and summary of relevant federal, state and local level policy and programs regarding digital connectivity and development.
- 3. **Consultations**: Discussions of emerging opportunities and barriers to digital inclusion and policy options going forward with relevant leaders in government, community, and industry.

We also drew on extensive insights garnered through other collaborative research projects, such as the *Northern Australian Communications Analysis* (Marshall et al., 2020a), developed for the Cooperative Research Centre for Developing Australia (CRCDA), and *Connectivity and digital inclusion in Far North Queensland agricultural communities* (Marshall et al., 2019), funded by the Australian Communications Consumer Action Network (ACCAN).

The findings in this paper capture the relationship between digital inclusion, economic development, and rurality, specifically in the context of regional and rural Queensland. Key concepts of hard (supplyside) infrastructure and soft (demand-side) infrastructure were used to frame the research, analysis, and consequent recommendations for state-level policies that will assist Queenslanders to leverage digital growth for social and economic prosperity.

2. Digital Inclusion in Queensland

Broadband and mobile infrastructure and services are the bedrock of digital development. Without access to reliable, fast, and affordable internet, businesses and sectors in regional and rural Queensland cannot thrive. Furthermore, individuals need to have or develop advanced levels of digital literacy and skills to implement and leverage digital technologies in their businesses, organisations, and homes. People who possess this essential combination of affordable access and essential digital skills are 'digitally included'. To set the context for this paper, we draw on the Australian Digital Inclusion Index (ADII) (Thomas et al., 2020) to describe the 'state of play' of digital inclusion as the basis for digital development.

The ADII defines digital inclusion as a combination of three dimensions: access (attaining connections and devices), affordability (ability to sustainably afford connections/devises) and digital ability (having the appropriate skills and knowledge to put connections/devices to good use). The ADII's methodology is an ongoing Single Source survey of 50,000 Australians gathered annually through face-to-face interviews. ADII calculations are based on a sub-sample of approximately 16,000 responses in each 12-month period. The Index is predicated on the notion of a 'perfectly included' individual who would score 100 on every measure.

Since the first ADII survey was administered in 2016, results have consistently shown that rural¹ Australians score lower across all three dimensions of digital inclusion. Improvements have been made year on year, particularly with regard to access, owing to the rollout of the NBN and extensions to mobile networks. However, the digital inclusion gap between urban and rural Australians is widening (Thomas et al., 2019), particularly in the dimension of digital ability. For example, Australians who are living in capital cities score much higher on all sub-measures of digital ability (attitudes, basic skills, activities) than rural Australians, with an overall digital ability score advantage of 10.2 points (53.3 in capitals versus 43.1 in rural areas).

This story is reflected and exacerbated in Queensland, where more urbanised regions—such as West Brisbane (67.7) and the Gold Coast (63.3)—have significantly higher digital inclusion scores than rural areas, such as Coastal Qld (56.7) and Central & South West Qld (58.2). The average score in Queensland in 2020 was 62.2. Figure 1 maps the urban-rural digital divide in Queensland. The more detailed data in Figure 2 shows that while rural Queenslanders score quite highly on *access* (72.8), they score poorly on *affordability* (52.3) and especially *digital ability* (45.2).

Improving digital inclusion in regional and rural Queensland is necessary for digital development to occur, by bridging the gap between *people* and *opportunities* afforded by the digital economy. This will also lead to overall better health and well-being; we know this because being digitally excluded has been shown to compound social and economic disadvantage, especially in remote areas (Park, 2017). For example, digital exclusion can limit access to services, jobs, and education.

¹ The Australian Digital Inclusion Index defines 'rural' as areas that are not capital cities, regional cities, or regional centres.



Figure 1: ADII scores in Queensland in 2020.

	Australia	dLD	Brisbane	Rural QLD	Brisbane Regions								Å		*	
2020					City & North	West	South	East	Outer*	Gold Coast	Sunshine Coast	Cairns	Townsville*	Central & SW QL	Coastal QLD	North West QLD
ACCESS																
Internet Access	87.9	87.5	88.5	85.1	88.6	90.4	88.8	88.7	84.0	89.8	87.7	84.7	84.3	86.4	84.5	85.1
Internet Technology	82.1	81.5	83.2	78.4	82.5	82.3	84.7	83.7	81.3	81.5	83.1	80.0	76.3	82.1	78.3	72.0
Internet Data Allowance	58.7	59.2	61.9	54.8	61.5	61.6	63.0	61.7	60.9	60.9	58.9	51.8	53.1	60.4	54.4	46.1
	76.3	76.1	77.9	72.8	77.5	78.1	78.8	78.1	75.4	77.4	76.5	72.2	71.2	76.3	72.4	67.7
AFFORDABILITY																
Relative Expenditure	54.7	53.8	57.9	46.2	55.0	63.2	59.7	59.5	52.8	52.3	55.8	47.4	52.8	50.8	41.8	56.2
Value of Expenditure	67.0	65.6	69.7	58.4	65.6	70.3	73.6	72.1	69.3	65.5	69.4	58.3	55.4	65.4	59.7	51.7
	60.9	59.7	63.8	52.3	60.3	66.7	66.6	65.8	61.1	58.9	62.6	52.9	54.1	58.1	49.3	54.0
DIGITAL ABILITY																
Attitudes	50.3	49.2	52.3	44.2	54.2	55.7	52.6	48.2	46.6	48.6	47.2	45.6	49.0	49.9	44.2	33.2
Basic Skills	59.4	58.2	61.7	52.2	61.9	65.0	63.9	57.3	57.8	57.1	60.6	54.9	53.0	58.4	50.9	45.7
Activities	46.1	44.8	48.4	39.1	49.5	48.5	50.3	45.6	43.0	42.9	46.0	39.9	40.3	45.2	38.7	29.4
	52.0	50.7	54.1	45.2	55.2	56.4	55.6	50.4	49.2	49.5	51.3	46.8	47.4	51.2	44.6	36.1
DIGITAL INCLUSION INDEX	63.0	62.2	65.3	56.8	64.3	67.1	67.0	64.7	61.9	61.9	63.5	57.3	57.6	61.9	55.4	52.6

*Sample size <150, exercise caution in interpretation. **Sample size <75, exercise extreme caution in interpretation. Source: Roy Morgan Single Source, March 2020.

Figure 2: Queensland Digital Inclusion by geography in 2020.

3. Infrastructure for Digital Development

3.1 Hard Infrastructure

In Australia, development in regional and rural areas has been slowed, at least in part, by a historical lack of telecommunications and broadband infrastructure. The tyranny of distance, the sparse customer-base, and other factors have made it difficult for governments and corporations to invest in broadband infrastructure in ways that are comparable to other essential utilities, such as roads, water, and power. The role of the public sector in Australian telecommunications has evolved in recent years. As Madsen and de Percy (2020, p. 21) observe, "over time, the government's role changed from owner/operator to that of policymaker/regulator, as the incumbent national opera-tor was divested." The Commonwealth Government's original aim was to harness private sector investment and deregulation of the telecommunications market, however, the need to develop faster broadband infrastructure networks that can supply the services needed was not achieved through the private sector and has led to greater public investment (Madsen & de Percy, 2020).

Ubiquitous access to digital connectivity infrastructure is not only essential for developing the regions; it is needed for a fair and equitable society. Currently in Australia, digital connectivity infrastructure (for mobile and broadband internet service) is owned, operated, and leased by a combination of public and private institutions. In the main, Telstra has a "natural menology" on voice infrastructure, in particular landlines and payphones, and to a lesser extent, mobile networks. The National Broadband Network (NBN) is the default wholesale fixed line broadband provider across Australia, with many retail service providers as consumer-facing intermediaries. The NBN fixed wireless and Sky Muster satellite that service rural and remote areas have been hampered by several issues, including unreliable service, lengthy installation delays, and poor customer support (BIRRR, 2018). In the face of these challenges, smaller carriers and service providers have emerged to meet niche markets that specialise in building/maintaining infrastructure in remote areas (Marshall et al., 2020a).

Mobile connectivity is improving across Australia. The nation's largest carrier, Telstra, now services almost 99% of the population with 4G, yet this equates to only 18% of land mass (Simpson, 2017). Challenges remain, however, for people commuting between townships in remote areas, such as farmers, freight workers, miners, health workers, educators, and emergency services. The Commonwealth Government's Mobile Black Spot Program has sought to extend the mobile footprint. Under the first five rounds of the program, the government's commitment has generated investment of more than \$836 million, delivering a total of 1,229 new base stations across Australia (Department of Infrastructure, Transport, Regional Development and Communities, 2020a).

The most recent Australian Infrastructure Audit (Infrastructure Australia, 2019) found that while most Australian consumers are positive about quality and access to mobile and broadband services, they are concerned about ongoing affordability of services. It notes, however, that "the specific needs of rural and remote users are often overlooked in upgrades to national telecommunications infrastructure" (Infrastructure Australia, 2019, p. 558).

3.2 Social Infrastructure

Emerging research suggests that social infrastructure—comprised of the facilities, spaces, services, and networks that support the quality of life and well-being of communities (Infrastructure Australia, 2020)—is critical for digital development in regional and rural areas. Social infrastructure, such as local government and businesses, bring the internet to life in regional and rural areas. An analysis of communications and digital inclusion in Northern Australia (Marshall et al., 2020a) found that workers who are embedded in social infrastructure—such as libraries, councils, businesses, and health facilities—often help people connect to the internet and access online services. For example, rural families often access computers and the internet at their local library to complete school homework.

A recent study in Central Western Queensland (Cavaye, Ham & Erdiaw-Kwasie, 2019) assessed the social and economic impacts of installing optic fibre broadband and mobile networks in remote towns in the Barcoo and Diamantina Shires. A key finding was that there was "improved business efficiency but change to business culture is needed" (p.7). More specifically, while many business owners are motivated to adopt digital technologies, some (particularly older) people did not possess motivation or skills to promote and operate their business digitally. Other research (Marshall et al., 2020a) suggests that a culture of digital participation can only be created and sustained through stimulating and investing in social infrastructure, in tandem with improved access, to provide people with appropriate places and support to get online and participate in the digital economy.

The recognition that both hard and soft infrastructure are required for digital development speaks to the broader concepts of digital inclusion that are emerging from scholarly literature. Namely, digital inclusion is about provision of essential support systems that enable individuals and communities to be self-sustaining in acquiring digital connections and skills to leverage them for socio-economic benefit (Ragnedda & Mutsvairo, 2018). Here, the important thing to note is that where access to digital connections and digital skills development is scant, existing barriers to social and economic opportunities (such as education, employment, and health care) are likely to be exacerbated.



Post Office in Tolga.

4. Digital Development in Regional and Rural Areas

For the purposes of this paper, we define 'digital development' as being at the intersection of digital connectivity and economic development. Accordingly, the paper considers how digital connectivity in regional and rural² Queensland underpins or otherwise contributes to localised development for individuals, families, business, and communities. The focus is on regional economic development, workforce development, small-to-medium enterprise (SME) development, and development in key sectors, such as agriculture.

4.1 Regional Economic Development

Freeman et al. (2016) investigated the importance of broadband internet connections for socioeconomic development in rural Australian towns, identifying business development as a key driver, along with education, emergency communication, and health. The highest rated business-related reasons to improve digital connectivity suggested by rural residents were to ensure economic development for the local area, and to enable local businesses to interact with external markets and become competitive.

Access alone, however, does not enable business owners to capitalise on opportunities afforded by the digital economy. Businesses and their supply chains must develop adequate digital capacity and capability to navigate new ways of doing business safely and productively. This includes product development and manufacturing; accessing new customers and enabling ecommerce; and undertaking online brand management and digital marketing. Research has shown that many of these skills are scarcer and less easily acquired in rural areas (Marshall et al, 2019).

Several Queensland-based Smart City initiatives provide examples of regional areas that have strategically embraced and developed digital connectivity to support economic development. For example, the Sunshine Coast Council's Smart City Framework (2015) "balances improvements to quality of life, economic growth and environmental sustainability through the implementation of key technologies associated with the development and attraction of businesses, the management and monitoring of pollution as well as key improvements to the transport, health and education sectors" (Cisco, 2015, p. 5). The framework is centred on a portfolio of 13 value-added technology services that provide a suite of benefits including a foundational high-speed fibre-optic network, city Wi-Fi, and smart lighting, parking, water, and power management systems.

Importantly, this Smart City Framework is supported by several other strategies that help ensure that these digital technologies are used and enjoyed by Sunshine Coast businesses and residents and are

² Using the ABS' remoteness structure (ABS, 2016) as a guide, this paper takes 'regional and rural' areas to encompass the following four ABS levels: Inner Regional Australia, Outer Regional, Remote Australia, and Very Remote Australia. References to 'urban' areas and populations include the remaining level of the ABS' remoteness structure: Major Cities.

leveraged to attract tech startups and entrepreneurs to the region. For example, the Smart City Implementation Plan outlines the local governance, partnerships and community consultation, and education that are necessary for the program's success. Also, 'Sunshine Coast: The place to be' (de Villiers et al., 2018) suggests a strategy for developing an entrepreneurship ecosystem on the Sunshine Coast to provide the physical and social infrastructure necessary to support new business in the digital economy. This holistic, placed-based approach to digital development is emerging as best practice in Australian regional economic development.

4.2 Workforce Development

Digital technology is transforming education and preparing the next generation of business leaders for the future workforce (NBN Co, 2018). ICT jobs in Australia grew by 27% between 2006 and 2016, while growth in overall jobs grew by only 17%. Between 2011 and 2016, Queensland had the third highest growth in digital economy jobs across Australian states or territories (75,000 jobs). In FY2017, NBN Co estimates that 660 Queensland jobs were enabled by access to the NBN network, and this is expected to rise to 7000 by FY2021. The COVID-19 pandemic has brought about a greater reliance on digital technology for work arrangements and job opportunities (KPMG, 2020). The NBN network is "also powering a rise in entrepreneurship, driving an additional 3,400-6,400 self-employed Australians in 2017, estimated to drive more than an additional 48,600-92,600 by 2021" (NBN Co, 2018a, p. 12).

Babacan et al. (2019, p. 5) further observe:

Significant workforce disruptions and change to industries are also anticipated in the near future due to new technologies, (automation and artificial intelligence), global competition for workers, ageing population, shift towards service industries and improved productivity gains. Advancements in technology in industry will be posing challenges to existing business models and practices, including workforce practices. Change is expected in the work tasks and locations to being undertaken, redefining the concept of work. New growth industries will require higher level of qualifications and skills. Given the lower ratio of educational qualifications in rural Queensland, retraining and reskilling are major considerations for future workforce scenarios.

Digital literacy is critical for developing a workforce capable of meeting the educational and occupational demands of the digital economy. Analysis of key terms used in Australian job advertisements from 2015 to 2018 shows that demand for digital literacy skills increased by 212%, and this demand is likely to increase in the next 10 years (e.g., by 2030, over half of all employees will be either digital workers or digital makers, not merely users) (NBN Co, 2018a, p. 13). In rural Queensland, these digital jobs will be in several key industries such as health, agriculture, and mining. Digital jobs are also appearing in rural Queensland within tech start-ups and other entrepreneurial activities. Indeed, in recent times Cairns had a greater density of start-ups per capita than South East Queensland (Department of Science, Information Technology & Innovation (Qld) et al., 2015).

Digital development in regional and rural Queensland is not only interlinked with workforce development, but also population attraction and retention (Babacan et al., 2020). Digital inclusion-

related barriers to attracting and retaining a young, skilled workforce have also been documented in Queensland's remote agricultural communities. For example, in the Northern Gulf in Far North Queensland, people working as contract musterers report inability to access essential health services and fewer job opportunities because they are often posted on social media (Marshall et al., 2019).

Relatedly, the term 'e-change' (as opposed to 'tree-change') has been used to describe the trend of city folk relocating to rural towns seeking reduced commute times, work life balance, and life satisfaction (NBN Co, 2016). The move from urban to rural areas is dependent on sufficient digital connectivity being available, and the NBN rollout has assisted in making regional areas more attractive and viable for people of all ages. The COVID-19 pandemic has bolstered the e-change movement by enabling employees to demonstrate that they can work effectively without being in the office (Diprose, 2020). Queensland destinations that have been identified as 'e-change zones' include Cairns, Toowoomba, and the Sunshine Coast. There are opportunities to strategically leverage the virtualised workforce to promote further population growth in regional and rural Queensland.

4.3 Small-to-Medium Enterprise (SME) Development

Ninety-nine percent of Australian small businesses now have access to broadband internet. This internet access has enabled many Australian businesses (42%) to use cloud computing, which has been a driver of change in how small businesses operate (NBN Co, 2018b, p. 6). Notably, small businesses now use a variety of applications (apps) to streamline various aspects of the business, such as finance (e.g., banking, payroll) and marketing and sales management (e.g., online orders, social media). As more processes go online driven by, for example, Queensland Government's DIGITAL1ST strategy, the need for reliable and affordable connections becomes ever more imperative for the productivity and sustainability of rural businesses of all sizes.

With the introduction of the DIGITAL1ST policy by the Queensland Government, and the increasing digitisation of the interfaces between SMEs and the Federal Government, Australian businesses are now conducting a majority of transactions with regulators and industry support services online. This can be challenging for rural businesses that have less reliable internet connections and lower levels of digital capability. For example, graziers can struggle to keep their mandatory training up to date, because modules are delivered via video online (Marshall et al., 2019). Also, hospitality businesses such as pubs and cafes experience interruptions to EFTPOS transactions that require continuous internet connections. Tourists often do not carry cash, which can lead to lost sales for a range of service providers including petrol stations, campgrounds, gift shops, and tour operators.

4.4 Digital Development in Key Sectors

A recent analysis of digital inclusion across Northern Australia (including North and Far North Queensland, the Northern Territory, and northern Western Australia) focused on three key sectors relevant to the present paper: agriculture, health, and First Nations communities (Marshall et al., 2020a). Findings and recommendations relevant to this Queensland-focused policy paper on digital development are summarized in Table 1.

Sector	Key findings	Recommendations
Agriculture	 Digital literacy is a key barrier. AgTech adoption requires strategic guidance and support. Innovation risks are real and should be actively managed. The agricultural industry may not be able to skill-up quickly enough. 	 Get farmers reliably and affordably connected by facilitating improvements to last mile access. Enable and facilitate digital communications and AgTech adoption on farms by incentivising farmers and service providers to work together to solve issues. Digital ability and mentoring programs that educate farmers in place (including participating in research).
Health	 Quality of digital hardware, software and connections is sometimes compromised in remote areas. Efforts are still needed to build confidence and capability in the digital health supply chain. Digital health should be rolled out in stages, learning along the way. Stakeholders along the supply chain, particularly clinicians, require support structures and policies that enable them to play their part safely and comfortably. 	 Provide up-to-date, compatible hardware and software, including training and maintenance (especially in remote areas). Institute more robust legal, ethical, and processual frameworks for digital health. Test and upscale ehealth and telehealth programs across Northern Australia through consultation and education of health workforce.
First Nations	 First Nations people are providing leadership in digital inclusion in Northern Australia. Digital inclusion efforts across Northern Australia could be more inclusive by incorporating First Nations perspectives into broader development of policy, programs, and research Knowledge-sharing through various forms is critical to digital inclusion in Northern Australia. Indigenous-led enterprise could more widely leverage digital technologies. 	 Scale up proven last mile access solutions in remote communities Include digital inclusion targets as part of closing the gap agenda Devise place-based, culturally appropriate digital literacy programs and scale into remote communities across Northern Australia

 Table 1: Selected findings from the Northern Australia Communications Analysis (2020)

It is important to note that big business, such as mines and corporate cattle entities, often have the capital and political influence necessary to fund and build their own robust, super-fast fibre networks. Unfortunately, although this fibre passes through many rural communities, it is not often shared with others for several reasons, including the requirements for the fibre's owner to hold carrier status under federal legislation.

4.4.1. Digital Agricultural Development

Digital development for the Queensland agricultural sector is a high priority for industry and governments. Adoption of agricultural technologies is expected to drive Australia's agricultural sector to \$100 billion industry by 2030 (National Farmers' Federation, 2018). One of the five pillars of the NFF's 2030 Roadmap is 'unlocking innovation', with success defined as:

- 1. Australia becoming a Top 20 nation for innovation efficiency;
- 2. Australia's farm energy sources being 50% renewable by 2030; and,
- 3. Every Australian farm having access to infrastructure and skills to connect to the Internet of Things.

Marshall et al. (2020b) have found that farmers are needing to acquire these connections and skills from a low base. Through analysis of a sub-set of data from the Australian Digital Inclusion Index, the authors reveal that people whose occupation is a 'farmer and farm managers' tend to score more poorly for digital inclusion (across access, affordability, and digital ability) than other Australians, even when other demographic factors are the same. That is, compared with a farmer, someone living in a similar region with similar levels of income and education, but who works in manufacturing, health, or mining, tends to have a higher digital inclusion score.

Possible contributing factors to farmers low levels of digital inclusion, and thus barriers to digital agricultural development in Queensland and Australia, include:

- farming homesteads being less well serviced than rural residences along transportation corridors, where communications infrastructure tends to be more available;
- financial stressors in agriculture that draw spending away from digital technology (e.g., drought, fluctuating markets); and,
- historical social, cultural, and material practices on farms that have produced different attitudinal orientations towards technology (e.g., lack of exposure to digital technologies).

A large-scale 2016 research project involving all 15 Research and Development Corporations (RDCs)— Accelerating Precision Agriculture to Decision Agriculture (Leonard et al. 2016, p.3)—found:

digital agriculture in Australia is in an immature state in many parts including strategy, culture, governance, technology, data, analytics, and training. With maturity ... the implementation of digital agriculture across all Australian production sectors ... could lift the gross value of agricultural production by 25%.

Under this scenario, Queensland's agricultural production could be increased from \$17.80 billion (DAF, 2019) to \$22.25 billion if digital agricultural could be brought to maturity. Importantly, however, agricultural sectors need a tailored approach to fostering digital inclusion. For example, livestock producers in more remote areas need support to acquire robust connections, and horticulturalists (who are usually more proximal to reliable and affordable digital connections and technologies) need support to identify, implement, and scale digital AgTech solutions. While there are a range of online tools available to assist farmers (e.g., <u>mapping tools</u>), more work needs to be done to understand the needs and applications of digital connections and technologies in different sectors that account for contextual and sector-specific opportunities and barriers to adoption.



Steer in Speewah.

5. Policy Audit

This section identifies and reviews the most relevant policies at the federal, state, and regional/local levels that have direct implications for development in regional and rural Queensland through digital growth. This is not an exhaustive list of relevant documents, but rather a generalised cross-section of some of the most current and relevant policies that provide the backdrop to the findings and recommendations of this paper.

The reviewed policies (Table 2) are operationalised in the context of federal-level legislation. Notably, the Telstra Corporations Act (1991), which includes the Universal Service Obligation (USO), provides that all Australians regardless of location must have reasonable access, on an equitable basis, to landline telephone services and payphones. Following several calls for updated legislation, and an inquiry by the Productivity Commission (Australian Government, 2017), in 2018 the Minister for Communications and the Arts announced that a Universal Service Guarantee (USG) would replace the USO and ensure all Australian premises, irrespective of location, have access to voice and broadband services. The CSG was legislated in mid-2020, stipulating a minimum broadband upload/download speed of 25/5mbps (Australian Government, 2018).

In June 2020, the Government announced the *Regional Broadband Scheme*. The Scheme, commencing on 1 January 2021, will require both NBN Co and operators of comparable fixed-line networks to contribute to funding for essential regional broadband services on NBN fixed wireless and satellite networks. Service providers that operate in urban areas will be required to pay \$7.10 per month for each premises on their network with an active high-speed superfast broadband service provided over a local access line, with the revenue used to subsidise the more expensive fixed-wireless and satellite services for regional and rural consumers (Department of Infrastructure, Transport, Regional Development and Communities, 2020b). While this does not guarantee broadband in regional and rural areas, the scheme will go part way to fulfilling the intended purpose of the CSG.

5.1 Commonwealth Policy Review

In Australia, internet and mobile services are mostly provided and regulated at the federal level. Therefore, digital participation and development in regional and rural Australia largely hinge on the infrastructure and polices of the Commonwealth. Importantly, related issues are on the COAG agenda and there is a Commonwealth-State Ministerial Forum with key working parties.

We review relevant federal policies pertaining to (a) visioning a prosperous, tech-savvy future for regional Australia (including Queensland), and (b) understanding the current 'state of play' and what should be done next, focusing on implications for regional and rural development.

First, *Australia's Tech Future* is a high-level national strategy for enabling "Australians (to) enjoy an enhanced quality of life and share in the opportunities of a growing, globally competitive modern economy, enabled by technology" (Department of Industry, Science, Energy and Resources, 2018, p. 6). It suggests that Australia can maximise the opportunities afforded by technological change across several sectors including agriculture, manufacturing, mining, tourism, government/social services,

health, education transport, emergency services and everyday services such as banking. For example, the mining industry can use 3D printers to quickly deliver critical parts, and drones can be deployed to collect real time data in dangerous locations.

Similar opportunities are also highlighted in the **Regions at the Ready** strategy (House of Representatives Select Committee on Regional Development and Decentralisation, 2018), which places greater emphasis on tech-enabled development in regional and rural areas. It identifies one of four megatrends impacting regional and rural Australia as 'accelerating technological change that is disruptive to established instructress.' It cites Armidale (NSW)—named a Top 21 Smart Community in 2016—as a notable example of a rural town capitalising on the digital economy by adapting to technological change. Australia's Tech Future described the specific case of the award-winning Armidale-based farm tech start up—<u>SmartShephard</u>—which produces electronic tags, attached to both mother animal and offspring, so that farmers can record and monitor behaviour and make more informed decisions (Department of Industry, Science, Energy and Resources, 2018, p. 35). Agricultural Queensland communities could take up similar opportunities, catapulting them on the international stage, thereby promoting further awareness and development opportunities.

Second, the Productivity Commission's report *Digital Disruption: What do governments need to do?* suggests that Australians will face technology-related impacts and challenges in several areas:

- 1. *Markets and competition*: Digital connectivity can help firms increase innovation and productivity, open new markets, and reduce physical capital requirements, but development may not be equitable in under-serviced areas
- 2. *Workers and society*: Technology-driven trends like automation and the 'gig' economy can threaten traditional jobs but also provide mobility and flexibility for workers, along with opportunities to develop new, high-value STEM skills.
- 3. *Government roles*: Governments influence development and pace of adoption of new technologies by, for example, modelling desired behaviours, incentivising uptake, and removing regulatory barriers. Governments also have a role in mitigating adverse economic impacts and risks to individuals, consumers, and the environment arising from digital disruption.

In the face of these challenges, the Productivity Commission's Chairman, Peter Harris, suggests that "by showing leadership in their own practices, re-designing regulation to enable rather than block the adoption of digital technologies, and mitigate community-level risks where practical, governments can do more than they appear to envisage today" (Productivity Commission, 2016, p. 3).

Finally, in 2017 the Australian Government established a **Regional Australia Taskforce**, supported by the **Regions 2030 Strategy** (Department of Infrastructure and Regional Development, 2017), whose aim is to improve the lives of rural, regional, and remote Australians across portfolios including health, education, transport and infrastructure, employment, industry, and communications. Within the communications priority area, the 2030 vision is: "Regional Australians will access modern and effective telecommunications and digital technology and services, no matter where they live," citing the National Broadband Network and Mobile Black Spot Program as its flagship programs. While improvements to NBN SkyMuster are an ongoing focus to support digital development in the regions, the strategy does not demonstrate how digital connectivity will be embedded in the other priority areas.

5.1.1 Programs, Funding and Resources

Some major infrastructure initiatives such as the NBN and Mobile Black Spot Program were mentioned previously. Here we identify other significant Commonwealth Government Programs, funding, and resources that directly or indirectly contribute to rural and regional digital development. Encouragingly, many of these initiatives take a place-based approach to meeting the needs and opportunities of specific regions.

The **Regional Connectivity Program** (Department of Infrastructure, Transport, Regional Development and Communities, 2020c) consists of \$83 million of targeted investment in place-based telecommunications infrastructure projects which maximise economic and social opportunities in regional, rural, and remote Australian communities. This is part of the Government's response to the 2018 Regional Telecommunications Review. Funding is granted via a competitive grants process that requires telecommunications providers and communities to form partnerships in design and delivery of digital connectivity infrastructure solutions.

Regional Deals, based on the successful *City Deals*³ model, brings together all levels of government around a clear set of objectives for development in a particular region. Deals are tailored to each region's comparative advantages, assets, and challenges and reflect the unique needs of regional Australia. Regional Deals supports 'a place-based approach' by putting community-identified priorities at the centre, and often include a digital development component. The first regional deal in Queensland is in the Hinkler region (Australian Government, 2020). It includes a commitment to an AgTech facility at Bargara which will be jointly operated by Central Queensland University and Bundaberg Regional Council, providing a dedicated space for research to improve farm productivity.

Two flagship digital development projects in Queensland funded under the *National Stronger Regions Fund* are as follows:

- 1. Connecting Remote Communities in Central West QLD (Barcoo Shire Council) Improved economic activity and sustainability in the Windorah, Birdsville, Bedourie, Jundah, and Stonehenge towns by providing 4G mobile access and unlimited capacity communications links to the national network.
- 2. Doomadgee to Burketown Fibre Link (Burke Shire Council) Fibre optic cable link with associated upgrade to Burketown telecommunication exchange will establish Burketown as first/last internet hotspot on the Savannah Way.

There are also several disaster response programs that support digital development in rural and regional Australia. For example, the *Strengthening Telecommunications Against Natural Disasters Program* will fund up to \$7.7 million in projects to deliver various modes of transportable connections

³ *City Deals* (as opposed to a Regional Deal) are also an option for a few regional cities in Queensland (e.g., Townsville City Deal announced in 2016). Advance Cairns is currently progressing a City Deal which is said to align with a number of key regional strategies including: The Far North Queensland Regional Plan 2009-2031; The Cairns 2050 Shared Vision; and The Cairns Regional Council Economic Development Plan 2018-2022.

such as satellite-supported cells on wheels, mobile exchanges on wheels, NBN Road Muster trucks, and portable satellite kits.

5.2 State Policy Review

The Queensland Government has several policies and programs across departments that have relevance and impact for regional and rural digital development. The State Government's work in these areas can be accelerated in response to the COVID-19 pandemic, and in many cases the emphasis and direction of policy and programming has been readjusted. For example, regulatory frameworks for telehealth are evolving rapidly. There has also been recognition of the importance of telecommunications infrastructure. The Government has established the Queensland Capacity Network (QCN), a statutory body that is jointly owned by Powerlink and Energy Queensland. QCN initial program has been to connect the existing fibre network (built and owned by Powerlink and Energy Queensland) to six key NBN Points of Interconnect (POIs) in Toowoomba, Bundaberg, Rockhampton, Mackay, Townsville, and Cairns. Having completed stage one on time, QCN is currently expanding their work to connect to all 22 NBN POIs across Queensland.

State-level policy for digital development in regional/rural Queensland largely aims to provide the necessary conditions for innovation to occur. *The Queensland Plan: Queenslanders' 30-year vision* (Queensland Government, 2014) provides long-term vision for 'vibrant and prosperous' communities across Queensland, naming 'thriving regions' as one of nine foundational areas (alongside infrastructure, health and well-being, education, governance, people, environment, economy, and community). The strategy implies that digital innovation will help facilitate effective state-wide responses to the digital economy. However, digital development is not highlighted or prioritised as an essential target or goal for sustainable social and economic development specifically in the regions.

DIGITAL1ST (Queensland Government, 2017) is focused on transitioning government services to predominantly online modes of delivery (i.e., 'digital government'), thereby transforming the way citizens, businesses, and government employees interact with each other, with a view to better meet individual needs and foster collaboration and connectivity. The program aims to transform government interactions with two key audiences. For *citizens*, interacting with government will be easier, using channels of the customers' choosing and services that will be increasingly designed around customers' needs. For *business and industry*, interacting with the government will be faster, using digital technology to make it easier to start and grow a business in Queensland. This will be delivered by keeping focus on eight priorities:

- 1. Solve the right problem;
- 2. Digital by default;
- 3. Create unified digital experiences;
- 4. Prefer open over closed;
- 5. Make it secure by design;
- 6. Harness skills and experience;
- 7. Leave no-one behind; and,
- 8. Experiment, learn and improve.

The Queensland Government is tracking its progress of going digital across all departments through its <u>Digital Projects Dashboard</u>, under the priorities of 'people', 'collaboration', 'connectivity' and 'trust'. Projects have been re-prioritised in response to COVID-19, with Queensland Health running 48 of a total 113 projects. DAF has five active digital projects displayed on the Digital Projects Dashboard, which support digital development in rural Queensland.

The Queensland Government's <u>Advance Queensland</u> (AQ) initiative has delivered an over-arching strategy and program of projects/funding for broad-scale economic development through innovation (digital and otherwise), including in the regions. One of the State Government's four key aims is to 'Back our regions to compete globally', and to achieve this 'We will work with regional communities to grow their unique competitive advantage to build industries and create jobs.' To this end, the AQ strategy highlights the state's investment in new digital infrastructure. Namely, the QCN fibre is a major initiative to harness spare capacity on the government-owned optical fibre network to sell backhaul services to telecommunications companies⁴. This strategic investment in digital connectivity signals the Queensland Government's understanding that economic development in the regions is dependent on robust internet connections, and that it cannot be left to the Federal Government and private companies to meet the internet demands of regional Queensland.

Outside of the Department of Premier and Cabinet, the Department of Housing and Public Works seems to house the Queensland Government's regional digital connectivity interests. In 2014 the *GoDigitalQld: Queensland Digital Economy Strategy and Action Plan* (Department of Science, Information Technology, Innovation and the Arts, 2014) outlined a vison for 'Queensland to be Australia's most digitally interactive state and to be recognised globally as a digital innovation hub.' This ambitious document outlines desired outcomes in its four focus areas: Queensland Government, Business & Industry, People & Communities, and Digital industry, and makes several suggestions for how rural and regional Queensland can 'go digital' for social and economic progress, including bolstering telehealth services in regional areas, livestreaming city-based events for remote audiences, and delivering digital skills programs through the State Library of Queensland.

The Department of Education's (2019) *Education Digital strategy 2019-2023* vision is for 'creative, connected and engaged learners now and in the future.' The strategy has two main stages. First, *Enabling* involves establishing foundational, contemporary infrastructure and devices; connected systems that dismantle traditional boundaries; and enhanced collaboration with third part technology and service providers. Second, *Maturing* involves enabling educators to engage their students in advanced technologies (e.g., AI, VR) to engage in real world challenges; and increasing digital literacy amongst educators.

In the Department of Health (2017), the *Digital Health Strategic Vision 2026* is 'Advancing healthcare for our consumers, clinicians and the community through digital innovation.' It outlines eight goals for digital health disruption, including greater patient engagement; more systemic, high quality, and safer

⁴ This network runs along the east coast of Queensland and through centres including Toowoomba, Bundaberg, Rockhampton, Mackay, Townsville, and Cairns, as well as many smaller communities close to these cities.

care; and improved access to expert knowledge. The benefits of digital government and digital health for regional/rural Queensland are self-evident (e.g., telehealth enables remote patients to access expert treatment over distance). However, the above-mentioned strategy documents do not adequately address the underlying issue that many regional Queenslanders still struggle to access internet and mobile connections. Moreover, there are skills gaps that prevent regional Queenslanders from reaping the benefits of digital services.

In the Department of Agriculture and Fisheries (DAF, 2019), the *Strategic Plan 2019-2023* aims to be innovative, responsive, and sustainable in its approach to productive and profitable agriculture. However, it does not outline specific digital development pathways to meet its objectives. On the other hand, the *Queensland Agriculture and Food Research, Development and Extension 10-Year Roadmap and Action Plan* (DAF, 2018) cites 'increased use of technology in the sector' (e.g., precision agriculture, large-scale computing, e-commerce) as a strength of the RD&E in Queensland agriculture and food. However, the roadmap lacks evidence that this is widespread across regional/rural Queensland. Furthermore, its strategies for 'increasing innovation and commercialization' do not go far enough to ensure stakeholders from across sectors are engaged and appropriately skilled to take up new digital technologies.

5.2.1 Programs, Funding and Resources

Several of the State Government's current initiatives, which somewhat reflect the ambitions of the **GoDigitalQld** strategy, are listed on the Department of Housing's current <u>website</u>. They include: the government's internal digital projects dashboard; support on tendering to provide ICT services to the Queensland Government; a portal to help businesses increase digital capability; access to the Queensland State Archives online; and a service to access and request government open data. While helpful, these initiatives seem quite disjointed and not targeted to relevant end-user groups. There are also details of the 'Improving mobile coverage in Queensland' program which lists projects in which mobile base stations and 4G small cells have been installed in Queensland through co-investment as part of the Federal Mobile Black Spot Program.

Building our Regions, a \$365 million Department of State Development, Tourism and Innovation initiative, co-invests in local government infrastructure projects in regional communities that create flow-on economic development opportunities and jobs. Funded projects related to digital development include the *Blackall-Tambo Internet Project*, the *Doomadgee to Burketown Optical Fibre Link Project*, and *Hope Vale Fibre Optic Link Project*, and the *Lockhart River Fibre Optic Project*. Priority seems to have been given to remote and Indigenous communities, to connect Queensland's most vulnerable populations to essential services and information, such as telehealth and emergency/disaster coordination.

<u>Queensland Disaster Resilience Fund</u> was announced in 2018 to support projects to strengthen the resilience of Queensland communities and help them better prepare for disasters, including through more robust digital communications. In the 2018-19 financial year, \$9.5 million was committed, with 62 successful projects including bushfire mitigation measures such as fire breaks, riverbank stabilisation, flood modelling and mapping, evacuation centre upgrades, and reducing disaster risk for

people with disabilities. Digital development related projects included: Ayton radio tower resiliency upgrades (Cook Shire), installation of flood cameras and river height monitoring (Croydon Shire), and installation of emergency power and Iterra IP satellite system (Kowanyama Shire). The projects highlight the interdependency of power and communications infrastructure, and reliance on satellite technologies in more remote regions.

Regarding digital capacity building, the <u>Queensland Business</u> portal offers several ICT-related resources for business which are relevant to regional digital development. A selection of the modules is shown in Figure 3. While these resources are highly valuable, regional, and rural Queensland are less likely to access them than urban people owing to lower levels of access, skills, and education about digital resources. A key challenge for digital development is reaching those who are most in need of assistance and who are also often the most isolated. Impact Innovation delivers workshops across Queensland via webinar based on this content. However, it is unclear how successful this program is in engaging people and helping them to translate new digital skills into economic benefit.

Digital (IT) strategy for business									
Key components of a digital strategy	Conducting a digital audit of your business	Creating a digital strategy							
Finding digital suppliers									
Cloud computing for business									
What is cloud computing?	How cloud computing works	Benefits of cloud computing							
Risks of cloud computing									
Broadband and your business									
Case studies of high-speed broadband in business	The national broadband network (nbn)	Your business in the digital economy							
Broadband support for business	Broadband applications for your business								
Information technology risk management									
What is an information technology risk?	Anaging information technology risks	Reducing information technology risks							
Responding to an information technology incident	Information technology risk management checklist								

Figure 3: Information technology (IT) for business, Business Queensland.

5.3 Regional Policy Overview

The contextual opportunities and challenges for digital development vary enormously across the 10 state development regions of Queensland⁵, owing to differences in demographics, culture, industry, and remoteness. It is therefore beyond the scope of this discussion paper to review local-level policy documents from each region in Queensland. Therefore, we instead provide an overview of the types of regional and local level policies and programs that tend to influence digital development. By way of an informal case study, we mostly provide examples from the Far North Queensland region.

<u>Regional Plans</u>, led by the Queensland Government, often include a digital development component (either directly or indirectly). For example, the Far North Queensland Regional Plan 2009–2031 outlines priority development areas (natural environment, regional landscapes and natural resources, strong communities, urban development, water management, transport, and infrastructure). Information communication technology (ICT) is listed under the infrastructure priority with the following objective: 'Affordable access to reliable and robust high-speed telecommunication throughout the FNQ region to ensure access to markets, information and services.'

Local governments and regional development organisations include a component of digital development in their *strategic plans*. For example, as early as 2013, the RDA in Far North Queensland identified the digital economy as a priority within the *Far North Queensland and Torres Strait Regional Development Australia Road Map* (RDA FNQ&TS, 2013). Likewise, the *Tropical North Queensland Regional Economic Plan 2011-2031* aimed to 'position TNQ as a digital economy' (Advance Cairns, 2011). Far North Queensland Regional Organisation of Councils (FNQROC) has also been active in advocating for digital development, having made several submissions to government on telecommunications issues and commissioning research to drive priorities (e.g., FNQROC Mobile Coverage Report, Digital Economy Group, 2019).

The *Local Governments Association of Queensland* has overarching policy documents and reports that cut across all regions and LGAs in Queensland. In its annual *Advocacy Action Plan* B (LGAQ, 2020a), LGAQ has frequently prioritised issues relating to digital development in rural and regional Queensland. For example, in 2019 and 2020 it called for State Government funding to support digital training for older workers. The *Digital Productivity Report* (LGAQ, 2020b) assesses the digital productivity of its member Councils through a survey that targets six areas: digital maturity, digital strategy adoption, enabling digital service delivery, uplifting digital infrastructure, and unlocking the potential of data. The report concludes that there is a digital divide whereby between small-medium sized councils are less digitally mature, can less access to robust connections, and lack digital skills in comparison to large councils.

⁵ Central Queensland; Darling Downs South West; Far North Qld; Mackay Isaac Whitsunday; North Qld; North West Qld; South East Qld North; South East Qld South; South East Qld West; Wide Bay Burnett.



Communications infrastructure in Forysath.

6. Insights from consultations

6.1 Commonwealth-level Insights

Consultations were conducted with a range of relevant policy officers in the Australian Government. The policy emphasis was noted as providing high individual-level access to digital connections; significant effort has been made to ensure that the Commonwealth Government has succeeded in providing sufficient infrastructure so that all Australians can connect to the internet. The NBN has made it possible for anyone, anywhere to connect to the internet. The USO and new CSG also guarantee individuals access to voice and data services, which is commendable given Australia's large land mass and sparse populations in many areas.

Where mobile connectivity is concerned, the Commonwealth participants said that there is coverage of 99.5% of the population and 31% of Australia's land mass. Participants said it is an inescapable reality that it is impossible to cover all terrestrial parts of Australia, and therefore black spots will always exist. As such, the Commonwealth is focused on helping to fill coverage gaps in a targeted way where it is needed most. A mechanism to achieve this is the Mobile Black Spot Program, to which the Commonwealth has committed \$380 million. Additional support is targeted to special needs and isolated communities and properties, such as Indigenous outstations. Moreover, there are plenty of providers in the mobile market and competition is encouraged.

Given the considerable investment the Commonwealth has made in mobile and broadband infrastructure, all Australians should be able to access digital connections. Still, there is acknowledgement that some areas (particularly remote) have specific infrastructure needs that deviate from standardised solutions, and that the government is responding through initiatives like NBN Local, a new team dedicated to improving the customer experience on the NBN access network for regional and remote Australia.

There was also recognition that some services are prohibitive owing to lack of affordability. Indeed, ACCAN (a national peak body for telecommunications) is now placing great significance on this aspect through its 'No Australian Left Offline' campaign (ACCAN, 2019). According to our consultation participants, the Commonwealth Government's key role in improving affordability is to create the right policy and regulation settings for the free market to offer competitive services to all Australians.

In recent times, the Commonwealth has contributed to improving affordability by, for example, making several adjustments to NBN wholesale pricing to enable retail service providers to offer better deals to regional and rural consumers. For example, the Sky Muster Plus product offers unmetered data on all online activities, except for streaming and VPN. This product was welcomed and praised by remote customers for helping to meet the increased demands on satellite broadband during the COVID-19 pandemic. Participants also said that financial support at the household level was available for low-income families, or special initiatives for affordable access in remote communities were provided as examples of equity efforts made by the Commonwealth Government. For example, the Centrelink Telephone Allowance provides funding and subsidies for phone and internet connection.

Another key issue identified by participants is lack of awareness of available internet and mobile services among individuals and businesses. This sentiment is backed by BIRRR who have recently turned their focus from advocating for improved internet services in the bush, to educating individuals about how to access the best and most suitable services that are available to them now. Oftentimes, individuals assign service faults to the satellite, fixed wireless, or mobile broadband connection without checking that their local hardware and settings are correct. With the help of services like BIRRR, people can often establish or improve their internet service by trouble-shooting issues locally. The new *Digital Tech Hub*, launched in December 2020, is an impartial, centralised IT Help Desk to help regional people attain the universal access that is promised.

Regarding drivers for digital policy development in the regions, the Commonwealth Government recognises that digital connectivity creates economic opportunities, attracts people to rural areas, and is essential for delivery of rural services such as health and education. Participants also said that digital connectivity is necessary for the business of government (e.g., MyGov), as well as national security (e.g., cyber security).

Participants said some Commonwealth departments and employees have been tasked specifically with driving digital development in Australia, including in the regions. These people actively seek to grow the technology sector in Australia by creating partnerships and seeking investment; they also work to help improve digital capacity of business (e.g., how technology uptake can be integrated into business strategy). Projects have several objectives, such as addressing the digital divide, enabling digital business during the COVID-19 pandemic, and assessing Australia's AI capabilities and opportunities. Similar to the individual-level scenario, there was a prevalent sentiment amongst a few participants that regional businesses now have sufficient access to the internet; they feel that the digital divide between urban and rural is more a function of affordability and ability to use digital technologies to improve business (e.g., online marketing). Affordability was seen by a number of participants as being linked to income levels of individuals and households rather than rurality.

Finally, there seemed to be genuine commitment from Commonwealth participants to provide individuals, families, businesses, and communities with the necessary digital technologies to remain socially connected in the 21st century, which contributes to individual and community wellbeing, particularly during trying times such as the pandemic. Moreover, attempts are being made through the Ministerial Taskforce and associated working parties to unite Commonwealth and state/territory visions and efforts regarding digital development. However, our overall analysis shows that while the Commonwealth is focusing on the national picture, the states must continue to advocate for themselves in competition with each other. Policy officers identified that there are gaps and fragmentation across jurisdictional challenges and fragmentation were identified in areas such as infrastructure investment (where and who invests), how to address market failures, and responsibilities for digital skills development. Duplication and coordination were identified, particularly, in skills development initiatives.

6.2 State-level Insights

At the State Government level, there was a similar understanding that regional and rural people and businesses do have access to internet services and improved mobile coverage. However, there was a greater level of awareness and empathy for lack of reliable, quality connections that are more ubiquitous in urban settings. For example, participants said that connections in isolated areas are more prone to outages/failures, there is often no redundancy in the system, and assistance for repairs can be difficult to attain. Again, participants emphasised the high costs of operation of digital connectivity as a major inhibitor. For many regional and rural households and businesses, the cost and hassle to connect, service, maintain, and upgrade hardware and software is often too great for people to take on. Participants said that people fear that if essential functions are reliant on mobile or internet connections and they fail, there is no Plan B and consequences can be devastating (e.g., remote water tank monitoring on grazing properties).

Participants observed that the Queensland Government is most responsive to the digital connectivity needs of regional and rural Queenslanders in the wake of natural disasters. Several programs aim to provide individuals and businesses relief from financial hardship in the wake of fires, floods, and droughts. At the regional development level, participants pointed to the Queensland Reconstruction Authority's *Queensland Disaster Resilience Fund* (mentioned previously). Similarly, co-investment from the Commonwealth and Queensland Governments of \$242 million is supporting Queensland communities in their recovery from the *North and Far North Queensland Monsoon Trough, 25 January to 14 February 2019* under the Disaster Recovery Funding Arrangements (DRFA) for Category C and D⁶. Likewise, the Queensland Government's *COVID-19 Adaptation Grant Program* assisted small businesses to pivot to COVID-friendly service delivery (e.g., online). While participants welcomed such initiatives, they felt that more could be done to address the digital divide in regional and rural Queensland as part of 'business as usual', thereby fostering digital development more holistically.

Consultations identified that there are also several initiatives being offered in different State Government departments, targeted toward their specific constituents. For example, the Department of Agriculture and Fisheries (DAF) has an *Economic Decision Support Tool Upgrade* project that aims to transition existing economic decision support tools to an online platform to inform decision making by growers and graziers, based on environmentally sustainable management practices. Participants also mentioned that DAF has a dedicated AgTech division within the department that is tasked with recognising digital transformation opportunities and barriers to adoption in order to drive policy, advocacy, and direct investment. The efforts of DAF to support agricultural industries to use technology for improving agricultural productivity, the development of smart farms, and agricultural innovation was recognised.

⁶ A similar \$20 million package has been established recovery from the 2019 Queensland Bushfires.



AgTech demonstration in Almaden.

While these are worthwhile initiatives, which in this instance contribute to digital development in the agriculture sector, or other relevant sectors such as health, the consultations identified that there is a need for a more defined overarching strategy for digital development in the regions. The State Government's mostly inward-facing *DIGITAL1ST* strategy (with its digital priorities clearly outlined) is not matched by an externally facing plan for how the State Government will support industry-led digital development in regional and rural Queensland. While this regional digital development 'portfolio' is situated in the Department of Housing and Public Works, its most visible strategy in this space over the last few years—*GoDigitalQld*—was noted to be siloed within the department and not able to gain sufficient traction across other departments.

A number of participants identified the need for a strong evidence base for digital policy development to underpin the nuances that such digital policy may entail. Research into barriers faced by communities and businesses in technology adoption, barriers to accessing digital technologies, social and economic innovations in digital adoption, business cases for opportunities and benefits in the short and long term, and workforce impacts were identified as areas where evidence was lacking.

Participants noted there is a need for a whole-of-government digital development strategy with a particular identification of initiatives for regional and rural areas. There has been significant restructuring in the institutional mechanisms that support digital connectivity and house digital information. For example, a Chief Customer and Digital Officer has been appointed to focus on digital transformation for online government services, but the Chief Information Officer role no longer exists. Following the 2020 Queensland State elections, the area that has responsibility for digital connectivity has been impacted by the Machinery of Government Changes. The area of responsibility is being relocated to the Department of Communities, Housing and Digital Economy, which is likely to bring further changes.

Participants also noted a feeling of disconnect between the state and Commonwealth's efforts to progress regional digital development. The delineation between state and Commonwealth responsibilities and accountabilities is not clear cut. For example, while the focus at the federal level is provision of infrastructure and access, states/territories are often called upon to co-fund solutions in 'hard to reach' places. For example, the *Mobile Black Spot Program* requires substantial co-investment from partners other than the Commonwealth. Programs like this also push states and regions to compete against each other for funding for projects that are equally necessary and, importantly, guaranteed under the Commonwealth's own policies and regulations. Accordingly, though there are several substantial exceptions, respondents identified that there may be difference of opinion about who pays for key aspects of digital connectivity, negotiations about cost shifting between state and Commonwealth, and possible fragmentation, duplication, or gaps. Some participants noted positive collaboration around digital infrastructure funding across the jurisdictions, but not in other areas like affordability and skills development (for community and SMEs).

Both state and Commonwealth participants identified issues about attitudes to digital technologies in the regions. For example, state-level participants suggested that there are misconceptions amongst rural/agricultural consumers that digital technologies are too expensive and do not provide good return on investment. Participants recognised that affordability of digital technologies is a complex issue encompassing several factors including cost of products/services, ongoing maintenance, household/business income, and cost-benefit of investment. As such, whether people are able to afford and/or see value investing in digital connections and technologies is highly dependent on specific circumstances and intended uses.

Finally, related to the Commonwealth-level insights about digital capability, state-level participants said that low levels of digital literacy and trust in digital technology can be a major barrier to uptake in the regions, especially in the agricultural sector (as reflected in our literature review). Participants said regional and rural consumers need to be more informed about their options and what can be gained from digital participation. Until the very recent establishment of the Commonwealth-funded *Regional Tech Hub*, there was no central, trusted source of information for consumers for impartial advice and information. As the Hub is established, and teething issues are ironed out, there may still be hurdles to overcome, such as the government's inability to make specific recommendations for commercial products directly to customers (which was highlighted by one of our consultation participants).

6.3 Regional-level Insights

With regard to access, the sentiment from regional-level participants (arguably those closest to the issues and people) was that internet and mobile reliability is still a major issue, despite changes to NBN Sky Muster and improved mobile coverage in the regions. Participants said that sometimes access cannot be achieved because the customer does not have the necessary technical skills to install the hardware correctly, even with over-the-phone assistance from a service provider. Others said that the level of skill required to install and maintain hardware in homes and businesses is unrealistic, leaving relatively technically competent people still not connected. While insufficient digital literacy was absolutely acknowledged as an issue, it is not the only or even main problem – infrastructure and access deficits do exist and need to be addressed. The question then becomes, who should take responsibility?

Participants said that local governments and regional organisations field requests from the public for overall improved digital connectivity in their regions. However, these organisations are often illequipped and under-resourced to address the issue or effectively refer it to state and Commonwealth governments. Participants observed that, when regional infrastructure and access matters are raised with the State Government, they are quick to 'pass the buck' to the Commonwealth. Moreover, participants felt that the Commonwealth and state do little to provide strategic direction, and education about upcoming options, for longer-term plans for Queensland- or Australia-wide connectivity. Accordingly, participants observed that regional and local efforts to improve digital connectivity access are often done in isolation from other similar efforts across the state, causing duplication. Lack of transparency in wholesale pricing of NBN, for example, can also undermine localised efforts to respond to market conditions. For example, one participant noted that NBN Co's introduction of Sky Muster Plus "invalidated" Activ8Me's 'Business Hub' product, which had been developed to fill a gap in the remote enterprise market.

Initiatives to support regional communities were welcomed by stakeholders. Commonwealth and state grant schemes were identified as the key mechanism for regional organisations and local governments to propose and build new digital connections. This often requires substantial partnerships to be built between several major stakeholders, including all levels of government, internet service providers, industry bodies, and community groups, which can help unite regional purpose. It also requires local governments to co-contribute considerable funds to digital infrastructure building and maintenance (e.g., Carpentaria Shire Council contributed \$1 million toward the extension of fibre optic cable from Normanton to Karumba, with a total budget being \$2.4 million).

Regional-level participants identified willingness in local government to back digital development. Participants said that local leaders "get it"; they know they need to evolve to meet the demands and opportunities of the digital economy (e.g., some councils have engaged with the concept of 'smart cities'). However, many councils are constrained by limited finances, resources, strategic direction, and digital capability. Oftentimes, especially in remote councils, limited rates funding is necessarily allocated to other essential infrastructure. According to the LGAQ, Queensland councils own only 3% of their local assets but are responsible for one third of service delivery in their communities. They therefore rely on grants to fund anything beyond water, roads, and power, such as telecommunications.

As was mentioned in the state-level insights, participants noted that frameworks for grant funding are competitive rather than collaborative and are very labour intensive with no guaranteed outcome. Participants questioned whether provisions could be made for proponents with similar needs to collaborate to apply for grant funding, thus sharing the workload, knowledge, and solutions across contexts. Moreover, it was noted that grants can be prohibitive to some regional organisations and local councils if they lack the wherewithal to propose robust technical solutions. Often one or two local people hold the necessary knowledge, and if they leave the digital capacity of the community is lost (this is very apparent in small remote communities where labour turnover is high).

Finally, participants noted some friction between the Commonwealth and local governments regarding local planning for digital connectivity infrastructure. In some instances, the Commonwealth exercises immunity powers to override planning processes of local governments in the interests of meeting higher level objectives. Such interventions from Commonwealth can lead to solutions being implemented that are suboptimal in the view of those living and working in the local area.



Auditorium at Undara Experience.

7. Discussion

The telecommunications landscape has been rapidly changing over the last three decades with emphasis on market competition, privatisation, and deregulation. In the last 10 years, the NBN has been a monopoly provider of broadband infrastructure while competition has been encouraged at the telecommunication (mobile and broadband) services levels. The roles of Commonwealth, state and local governments have varied in this process with greater and lesser involvement in investment in infrastructure, service delivery, and regulation, and addressing equity issues.

The COVID pandemic has brought into focus some new priorities for economic, social, and digital development in regional and rural areas for all levels of government, ushering in some new and expedited policy agendas. At the federal level, there seems to be a renewed and strengthened push to do more to get digital development right in the regions. For example, NBN Co has established NBN Local, a business unit solely focused on meeting customer needs and raising the digital capability of regional and remote communities across Australia. Also, as part of its new five-year plan, Infrastructure Australia is seeking advice from key regional stakeholder groups to ensure that, not only is hard connectivity infrastructure adequate to meet the growing needs of regional economics, but that these communities have the localised digital capacity to progress their social and economic pursuits. Priorities of the Commonwealth's Digital Technology Taskforce (established in Sept 2019) are being pivoted to meet the needs of a post-COVID Australia, including a JobMaker Digital Business Plan.

Prior to the pandemic the Australian Government laid out an ambitious agenda for digital development in regional and rural industries such as agriculture, manufacturing, and mining (see *Australia's Tech Future*, 2018). Our research indicates, however, that these targets are unlikely to be met without further significant strategy and investment in digital connectivity infrastructure beyond what has been committed through programs such as the Mobile Black Spot Program. Our consultations with Federal Government revealed a genuine commitment to getting the regions connected, but a lack of awareness of the work that is still required to support present and future digital development. The recent introduction of the Customer Service Guarantee (which replaced the USO) is a fantastic start, but more needs to be done to bring internet provision in line with other essential utilities, such as roads, energy, and water.

A critical distinction must be made between no service and under-service. Theoretically speaking, it is possible that every Australian could have access to an internet connection. For many people in rural areas, however, this connection is tenuous, expensive, and limited in terms of data and speed. Moreover, some regional and rural people share this connection with several other people, which dilutes their access (e.g., some Indigenous communities have a single Wi-Fi hotspot to service several large families). In such circumstances, under-service thwarts people's pursuit of social and economic opportunities through digital connections. Policy and regulation at the federal level must support implementation of digital connectivity infrastructure that not only addresses today's deficits but meets the future demands of communities and industries in terms of data and speed. It is hoped that the post-COVID response will hasten and sharpen the Australian Government's efforts to meet its obligation to universally provide digital connections.

As is the case at the federal level, the COVID pandemic has brought into focus some new priorities for economic, social, and digital development in regional and rural Queensland. There is particular interest in long-term, broadscale investment in telehealth and ehealth within Queensland Health. The possibilities for customer-centred care in regional and rural Queensland, enabled by digital technologies, are vast. This would require, however, a substantial re-framing and restructuring of service delivery, for example, from distributed primary health networks to centralised virtual healthcare hubs. Similar transformations may be required in other industries, such as training and education, for significant efficiencies to be reaped from digitally enabled solutions. Similarly, further support for SMEs to transition to e-business, including formal and informal training opportunities, are needed to build digital capacity in regional sectors.

Telecommunications infrastructure provision, and setting the context for private infrastructure investment, is principally the responsibility of the Federal Government. The Queensland Government and its constituents must therefore largely rely on existing connections, notwithstanding the state's investment in some of its own fibre networks and co-investment in privately owned networks. Accordingly, the State Government's efforts to support digital development in regions more frequently targets capacity building outcomes in the related fields of innovation, entrepreneurship, and upskilling (e.g., Advance Queensland). While these programs have produced some outstanding examples of rural digital development, the capacity of whole regions to thrive in the digital economy is somewhat undermined by the lack of truly universal access and, importantly, insufficient digital skills development in rural industries, particularly in agriculture.

There seems to be a lack of coordination between the federal and state governments to address digital inclusion deficits and promote digital development. State/territory governments must often compete to make a case for increased federal investment in digital infrastructure in their regions, rather than uniting with the Australian Government to solve the issue nationally. Given that essential infrastructure such as energy and water is a federal-level area, states may be reluctant to allocate their own budgets to national-building telecommunications and broadband infrastructure, like the NBN. Moreover, private entities ultimately supply the services and commercially benefit from such infrastructure. Indeed, getting the policy and regulation settings right to promote investment in infrastructure, and competition between providers, is a tricky ask, particularly in more sparely populated areas.

At the regional level, local governments (and other social infrastructure organisations) bear much responsibility for providing on-the-ground support for individuals, businesses, and communities to get connected and pursue digital opportunities. For example, local libraries are often the 'go to' place for digital assistance, including trouble-shooting hand-held devices, accessing computers, and attending digital skills programs. Councils and community organisations also often organise or host industry-led digital development workshops, such as social media for business or introductions to agricultural technologies (e.g., drones, IoT, etc.). Despite the crucial role social infrastructure plays in sustaining the digital inclusion ecosystem in their regions, it is chronically under-resourced to do so, owing to the previously mentioned grants funding models among other factors.

Overall, the pandemic has highlighted and exacerbated several digital development issues and challenges, but also provided a launch pad for 'Getting it right out there', such is the title of the

triannual *Regional Telecommunications Review* undertaken by the Commonwealth Government. Our research has shown there is willingness at all levels, but there is disconnection in coordination of investment, effort, and resourcing by commonwealth, state, and local governments. Commonwealth and state governments have yet to outline a unified vision for digital development. A coordinated effort and place-based solutions are required that span access, affordability, and digital skills to work toward digital development in support of self-determination in regional areas.

8. Recommendations

The following recommendations using the digital inclusion lens stems from the framework explained in the introduction to this paper. Namely, there needs to be a greater conceptual understanding among policy makers regarding the critical relationship between hard and social infrastructure, and interreliability between supply and demand sides of digital development ecosystems.

The six recommendations that follow from the findings from our consultations are:

1. Devise a clear overarching Queensland digital development policy that aligns with regional development priorities and combines connectivity, service support, and digital literacy issues.

- The Queensland Government should work with local government, industry, and community interests to devise a cohesive vision and strategy for digital development in the regions, seek bipartisan support, and then work to progress whole-of-government accountabilities for implementation.
- The Queensland Government should consider (re)appointing a Chief Information Officer to oversee policy and strategy development and implementation for digital development, to complement the work of the Chief Customer and Digital Officer in overseeing the transition to digital government services.

2. Address the urban-rural digital divide with appropriate place-based analysis, planning, and solution building.

- Policy makers need to acquire an on-the-ground understanding of where the connectivity gaps are, and support regional and local organisations (particularly Regional Organisations of Councils and Councils) to identify and pursue options and opportunities that meet local community and industry needs.
- In a clear and transparent way, the Queensland Government should support regional and local communities to work with the Commonwealth to target investment in areas that have greatest need, starting with a full audit of available hard infrastructure to be leveraged.
- Governments must replace generic and top-down approaches to regional and rural areas by "including these communities in decision-making and implementation, or by introducing community-ownership of projects" (Salemink et al., 2017, p. 367).
- Alternative models of digital infrastructure planning and investment should be considered (e.g., social enterprise, public-private partnerships).
- Place-based approaches should integrate solution-building around digital connectivity, service support, and digital capacity/literacy issues.

3. Strengthen cross-jurisdictional collaboration for policy and program development and streamline state-regional engagement.

- Establish mechanisms for regional stakeholders to coordinate their efforts among councils, businesses, and community organisations from other jurisdictions to design and deliver solutions that work in regional and rural Queensland, thereby reducing duplication.
- Provide facility or coordinative mechanisms for regions to exercise collective technical analysis and buying power and seek collective investment in projects with shared benefit.
- Consider restructuring grant processes to promote collaboration versus competitive approaches where appropriate, and ensure funding is needs driven.

4. Critically examine policy making across government in relation to post COVID-19 recovery for fair and equitable digital development.

- Examine the balance between social equity and economic growth considerations in investing in digital connectivity and capacity post-pandemic.
- Making substantial investment in social infrastructure can bring digital connectivity to life in regional and rural areas, and promote social cohesion, equality, and wellbeing.
- Devise "a customised policy framework that is responsive to the diversity and uniqueness of local contexts in connectivity and digital inclusion" (Park et al., 2019, p. 139).

5. Develop and fund strategies and programs that support greater embracing of digital technologies in key industries and grow digital literacy.

- The Queensland Government should assist local governments to devise local-level policies and programs for digital development, including digital innovation and diversification of economies.
- Co-design programs with key stakeholders to assist regional and rural people to harness digital acceleration and agile business operating models (e.g., pilot projects).
- In partnership with the university sector provide stronger regional and rural support for building digital skills for the future. For example, employ subsidies and return to work incentives for digital skills development, or increase micro-credential course options.
- Embed digital skills development into all levels of education and training, and link to industry opportunities, to build and retain digital capability in the regions.
- Fund touring digital literacy contractors to provide training and support for locals and help embed digital capacity into local social infrastructure.

6. Fund targeted research to provide robust evidence for addressing industry and community needs, skills, and solutions for digital development.

- Fund targeted research to inform policies and strategies and for engaging regional and rural people in digital development, both concurrently preempting and managing key issues (e.g., safety, security, big data)
- Fund research to inform digital education and workforce development strategies to accompany the overall regional and rural digital development policy and associated activities. This should be tailored to key sectors such as agriculture, tourism, and health.

Regional and rural Queensland contributes in a significant way to the economic and social outcomes of the state. As the major global changes continue to bring disruption at the state, regional and local level, digital connectivity will be an important part of being resilient and adaptive. It is critical that that regions are digitally enabled to continue to prosper. Post-COVID, there is a growing expectation amongst the community that digital infrastructure be accorded the same essential status as energy, water, and transport. If the necessary hard and social infrastructure for digital development is not forthcoming, regional and rural Queensland will face an even greater risk of depopulation and declining livability. Conversely, Queensland has a grand opportunity to capitalise on the regionalism and e-changers movements to build thriving industries and communities in regional and rural areas.

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