THE UNIVERSITY OF MELBOURNE

Networked Society Institute

Initiatives for the Digital Economy Agenda (IDEA)

A response to *The Digital Economy: Opening up the conversation*

About the Networked Society Institute

An ever-increasing number of people, places and things are being connected to each other via networks. This is driving transformative changes across the community, impacting our economy, society and culture. These connections are changing how we live, work, travel and socialise, the management of our environment, and how we deliver services.

The driving force of this transformation is the concurrence of digital networking and automated technologies. The shift from analogue to digital has impacted all industry sectors, via the increased creation use of data across society. Networking technologies are enabling the greater interconnection of people, places and things via the internet, and are supporting the capture and transmission of increasing volumes of data. Finally, automation is occurring through the application of data, computer processing power, and robotics. Automation is moving beyond the internet and is an emerging feature across industries enabling new services, displacing workers and supporting new applications.

An increasingly connected world has eliminated the traditional barriers of space, time, and exclusivity, through access to different networking platforms. Such dynamic interactions raise concerns about security, privacy, and data protection. However, this must be balanced against the benefits of increased access to enhanced services, products, and relationships made possible by the automated conversion of data into aggregated knowledge.

The provision of health services, transport and education can now be customised to individual needs. Additionally, automation is altering the nature of work. This is enabling productivity gains and transforming entire industries, providing significant benefits for the community. However, the potential negative impacts of these transformations also need careful consideration.

There are some fundamental questions about how society engages with these new technologies. In a world of multiple legal jurisdictions, regulatory regimes and ethical considerations, there are key challenges relating to how data is obtained, stored, processed and used. This requires reconceptualising information security and integrity from social, political, legal, ethical and governance perspectives.

The University of Melbourne's Networked Society Institute conducts interdisciplinary research that addresses the impact of connectivity on society. The Institute hosts the University's Australian Cyber Security Centre of Excellence and an interdisciplinary research network – Data, Systems and Society Research Network (DSSRN), exploring the data-driven approaches and their societal implications.

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Key points

This submission responds to questions 1–7, 9, 10, 20, 21 of the Commonwealth Government's *The Digital Economy: Opening up the conversation* paper.

In summary, The Networked Society Institute supports:

- identifying four pillars around which a Digital Readiness Strategy may be organised: digital infrastructure, digital skills, trust in digital networks, and the use of digital technologies.
- implementing the recommendations in the Productivity Commission's *Data Availability and Use* report.
- embedding smart technology in all major infrastructure, ensuring that government assets are encompassed within the 'Internet of Things'.
- focussing on the social and ethical implications of digital advancement and enhanced data collection.
- adopting a 'Digital Workforce Initiative' that includes new approaches to digital skills provision e.g. the STEM Education Resource (SER) developed by the NSI, and the use of interdisciplinary postgraduate fellowships.
- establishing interdisciplinary graduate, postgraduate and postdoctoral fellowships, which would: (1) heighten the level of research collaboration between higher education providers and industry; and (2) generate greater economic benefit from university research.

Digital Readiness

Conventional digital readiness often refers to an organisation's focus on skills, trust, and use. Digital readiness as a national capability needs to be expanded to include strategic commitment and digital infrastructure. The National Broadband Network initiative is one such commitment. The NBN project represents a significant improvement to Australia's digital infrastructure. However, the design of the broadband market and its regulatory settings could be an impediment to competition, to consumer and business trust, and to realising the economic benefits of high-speed broadband connectivity. Australia's digital readiness would be significantly improved by making our infrastructure—roads, buildings, rail, ports—digital ready at the outset, not as an afterthought.

The government has recognised the uneven state of digital readiness across industry sectors. To remedy this the government, in reflecting upon the long term strategic framework and its infrastructure commitments, should actively adopt a digital first approach. The collection and storage of health data is an example of an area where there is room for improvement. The lack of a cohesive national strategy for the implementation of a universal personal health ID is inhibiting innovations in digital health. The Productivity Commission's enquiry into Data Availability and Use identified major improvements to data governance in Australia. The government should accelerate the adoption and implementation of the Productivity Commission's recommendations, to help drive digital innovation capacity across key sectors.

As a key part of the development of digital strategy, government should focus its Digital Readiness efforts on 4 pillars – digital infrastructure, digital skills, trust in digital networks and infrastructure, and use of digital technologies.

1. How are advances in digital technology changing the way you work, your industry and your community?

The Networked Society Institute has an interest in the convergence of digital networking and automation technologies, and in their transformative influence across key sectors. There is no sector that is left untouched by the profound transformation of this convergence. In the past, digital – or more broadly ICT – was an identifiable sector on its own right. With convergence, Australia's strength ICT capability will become embedded across key sectors of the economy, e.g. agriculture, food, mining, and health. We should be addressing how advances in digital technology can drive further transformation and productivity gains in these sectors.

For example, 'precision agriculture' promises significant efficiency gains, and has the potential to attract a younger generation to farming. Likewise, digital technologies can make Australia more competitive as a premium food producer, in particular through the use of authentication technologies as a key part of the approach to logistics. Digital and automation technologies in the mining sector can help to balance economic advantage and environmental risk mitigation, as well as improving safety and efficiency. Rising health costs can be tackled through greater adoption of digital health initiatives that deliver efficiency gains across the system, and that promote a bigger focus on prevention and wellbeing programs. Driving this transformation across the economy requires the combination of digital skills with broader interdisciplinary and translation skills.

2. What is your vision for an Australia that thrives in a digital economy? Where would you like to see Australia in five, 10 and 20 years' time?

The digital economy should not be seen as a self-standing sector in its own right. Digital technology is an enabler of economic activity across many sectors, and will determine the economic competitiveness of the Australian products and services. We anticipate that the size of the digital economy as an export will be far less than its economic value in transforming other sectors.

3. What is the role of government in achieving that vision?

Strategic Commitment
As a key strategic commitment, government should identify ways of facilitating the development of the Internet of Things – making infrastructure 'smart' should be a priority of governments at all levels. At the Commonwealth level, this could be achieved by requiring the inclusion of digital technology as a condition of any infrastructure investment or grant. Additionally, the Commonwealth should accelerate the implementation of the Productivity Commission's recommendations in the *Data Availability and Use* report.

Digital Infrastructure
Australia's economic future relies on the development of both regions and cities, which will require a more integrated approach to digital infrastructure. Australia should be prioritising the roll-out of digitally enabled infrastructure. Such developments can enhance the capacity of local economies, helping to cultivate local strengths that will encourage growth in other sectors and facilitate global opportunities.

Digital Skills
Australia should complement its existing post-secondary skills system with the introduction of a more advanced training framework that promotes both translational and interdisciplinary skills. During the past decade, digital businesses have increasingly outsourced and offshored digital skills. While there are immediate benefits to those business, this trend has the effect of limiting the skills profile in Australia. This may be addressed by ensuring our training programs promote more active job placements for digital graduates, and by having a bigger focus on digital trade qualifications to provide hands-on opportunities to applying the relevant skills. Our research training framework should offer differentiated programs, such as interdisciplinary postgraduate scholarships, to encourage people with digital skills to work on problems outside of the areas of their initial training. A further initiative may be the creation of a limited number of fellowships for early career researchers to translate their ideas into products and services.

Digital Trust
Australia should move quickly to modify the data governance regime in line with the Productivity Commission's recommendations. This would help create an environment more conducive to trust in digital technology and networks. Fostering greater trust requires an appropriate ethical and governance framework that balances community concerns with social benefits and economic opportunities.

Digital Use
All levels of government need to be proactive in promoting the use of digital technologies, both to improve government services and to encourage local industry to be part of the digital transformation initiatives. Recent and planned investments in Cyber Security are welcome; these will address risk concerns relating to the adoption of digital approaches. Similarly, there is an urgent need to develop national advisory and skills framework in digital governance, resilience, ethics and technology use, in order to build the capacity among small and community organisations in embracing digital approaches.

4. What key disruptive technologies or business models do you see? What do you predict is on the horizon in five, 10, 20 years' time?

We anticipate the rapid proliferation of the Internet of Things and of 5G wireless networks that allow businesses and other service providers to deploy digitally smart offerings. Due to the significant investment and capacity building required, there will be more opportunities for those who can provide the linkages between emerging infrastructure and traditional services, creating a new class of digital economic operators. Those who do not have a network can offer value in a platform-based manner, facilitating value creation. For example, building services could be managed by these digital enterprises by linking the traditional builders with those who use the buildings for their activity. The digital building service enterprise will not own buildings and will not have a permanent trade workforce to manage the service delivery. They will only manage the implementation of digitally smart infrastructure. This could potentially reduce the operating costs of buildings, roads and bridges in the future.

A similar model could drive the uptake of precision agriculture among farming businesses. Digital economic enterprises could organise data collection and integration, and provide insights that assist farmers. Digital economic enterprises with a focus on digital knowledge integration will not own either the digital infrastructure or data infrastructure. They will be purely delivering a *knowledge integration* service, by connecting farmers with leased infrastructure providers (internet of things provider for example), public data agencies and data or cloud service entities, providing domain specific insights by working with a pool of experts and automation approaches.

Hospitals could benefit from a focus on the delivery of patient-oriented outcomes, while new shared service models could offer partly automated and partly customised management of behind-the-scenes support models. These models could also potentially promote greater efficiency in other areas, such as services and infrastructures managed by state or local governments.

Digital Infrastructure

Digital infrastructure plans should be a major part of the strategic commitment to digital readiness. As part of the digital infrastructure focus, Australia should have a national commitment to digital enablement of physical infrastructure by encouraging rapid deployment of Internet of Things infrastructure and by accelerating the mobile network expansion with 5G capabilities over the next decade.

Despite the NBN, some regional Australian businesses are struggling to get high quality and high-speed connectivity. While satellites can provide basic access, there should be a focus on expanding wireless connectivity in regional areas and on the capacity for NBN to delivery high-tier connectivity in regions.

5. What communication services, and underlying data, platforms and protocols, does Australia need to maximise the opportunities of the digital economy?

Internet of Things (IoT)
Australia should target a mixed approach of using mobile networks to offer narrowband IoT services, dedicated low power IoT services, as well as embedding digital infrastructure within physical infrastructure.

5G Mobile network expansion
Australia should embrace the rapid adoption of 5G where appropriate and encourage advanced 4G to be made available across the nation.

Upgrading of NBN
The focus of the regulatory framework that supports the NBN should be reset to: (1) drive improvements in customer satisfaction through appropriate monitoring of service standards; and (2) to ensure that broadband is upgraded when new technologies become economically viable.

Data custodians
There is a need to identify data custodians to manage public and shared data to facilitate appropriately regulated access for private and community organisations.

6. What opportunities do we have to accelerate the development of technologies that will underpin Australia's digital economy?

Australia needs to address the uneven adoption of digital approaches through an appropriate mix of strategies, incentives and initiatives. For example, towns and regions should be entitled to an extension of 'Enterprise Connect', allowing the establishment of a small innovation hub with high-speed connectivity and shared office spaces to empower local enterprises to collaborate and participate in the global digital economy. Australia should adopt a holistic approach to local innovation, which includes supporting digital innovation centres in regional communities. This will promote skills transfer and the development of a skilled workforce locally. The approach can be linked to government's own procurement and public private partnership models.

Standards and Regulations

7. What opportunities do we have in standards development and regulation to:
– enable digital entrepreneurship, innovation and trade?
– mitigate the risks associated with digital disruption?

Digital Economy or Innovation Index
Through 'Innovation Australia' and its connections to other data collection agencies and academic institutions, Australia should develop a comprehensive methodology to capture the economic impact of the digital economy, using this to inform future policy decisions.

Digital Innovation Hubs
A distribution of hubs across towns and cities will promote the uptake of new technologies and provide a setting for new, digitally-enabled businesses to form. Such hubs could leverage off existing community-facing infrastructure, such as community centres and libraries, offering additional co-working spaces and greater access to skills and know-how through remote connection to other locations.

Trust, Confidence and Security

9. What opportunities do we have to build trust and community confidence through resilience to cyber threats, online safety and privacy?

Regardless of their size, all organisations are challenged by the ethical dimensions of digital progress and need to factor appropriate responses into their business costs. New approaches to digital ethics and to governance arrangements are needed to support trust around the adoption of digital and automation technologies.

Australia can build trust and promote the adoption of new technology by investing in a Digital Ethics Centre, with a mandate to research the implications of data-driven approaches, pervasive network connectivity, and automation. This research will help to drive education, and help organisations deal with the emerging ethical challenges relating to the use of data and digital technology. The Productivity Commission called for an expert advisory network to provide advice on data custodian issues. This could be complementary to legislative reviews and practice guidelines, offering practical guidance to organisations embracing new technology.

Some of the Networked Society Institute's recent projects explore these challenging issues:

- http://networkedsociety.unimelb.edu.au/news-events/news/digital-connectivity-privacy-iot
- http://networkedsociety.unimelb.edu.au/news-events/news/downside-fitness-trackers-health-apps-privacy
- http://networkedsociety.unimelb.edu.au/news-events/news/can-consumers-expect-privacy-in-an-internet-of-things-world

10. What roles should government, business and individuals play in protecting the community in a digital economy?

Governments should ensure that the revisions to the legislative arrangements relating to data governance, privacy, and security currently under consideration reflect new best practices and support a framework of continuous improvement.

Governments should help organisations meet or exceed community expectations by creating knowledge hubs around digital ethics to support greater understanding among all stakeholders. It should also lead by example and adopt a principled data protection framework for its dealings.

It is also important that the community be engaged in the conversation around developments in the digital economy, so that these developments and the governance framework reflect community standards and expectations.

Empowering All Australians through Skills and Inclusion

20. What opportunities do we have to equip Australians with the skills they need for the digital economy, today's jobs, and jobs of the future?

The Networked Society Institute offers a series of suggestions:

- **A 'Digital Workforce Initiative'** should focus on our key skills gaps, supporting skills development in these areas. The Initiative would complement existing programs across the secondary, vocational and higher education sectors. Such an initiative would be supported by a digital workforce strategy that charts the transformation of jobs driven by digital disruption, and that provides the direction for a more adaptive and resilient workforce.

- **Access to STEM education** is crucial, ensuring students develop relevant digital skills to support their future careers, whichever path they choose. The Networked Society Institute has developed a STEM Education Resource (SER) that allows students in years 9 and 10 to complete four modules that involve developing a solution to an open-ended problem. The modules support students' abilities to undertake STEM investigations by developing the high-level knowledge and skills required to solve real world problems. SER has been designed in partnership with teachers and provides a modular platform to support any number of investigations. An approach of this kind could be adopted nation-wide. For further information see: http://networkedsociety.unimelb.edu.au/research/projects/active/stem-education-for-schools

- **Expanding Digital Internships** will further raise Australia's digital skills profile. Ensuring that ICT graduates have an opportunity to undertake an internship – embedded within their study program – is one possible approach. This will support problem-solving across the economy, allow for the dissemination of digital approaches and equip the workforce with an understanding of emerging industry needs and challenges. Such an initiative needs to be a partnership between government, higher education institutions and industry.

- **Interdisciplinary postgraduate fellowships** would enable the future workforce to obtain the broader set of skills required to understand problem domains. Through such a scheme, government could facilitate collaboration between higher education providers and problem domain owners. The result would be a cohort of local graduates with direct experience in industrial research and development, as well as enhanced interdisciplinary collaboration across

the higher education sector. This could be implemented along with a SPIRT model which existed within the linkage projects program of the ARC.

- **Interdisciplinary postdoctoral translation fellowships** could function in a similar way to postgraduate fellowships, but with a targeted focus on translation from research to industry. A small cohort of research higher degree graduates would be provided the opportunity to team up with businesses across different domains to translate research outcomes into a market opportunity.

21. What opportunities do we have to bridge the 'digital divide' and make the most of the benefits that digital technologies present for social inclusion?

Digital technologies provide a wealth of opportunities to bridge the digital divide. The Networked Society Institute has undertaken research across a number of areas to address the key challenges arising from the digital divide, focusing on how connectivity can ameliorate social exclusion. For example, a number of these research projects have addressed the use of digital technology in Indigenous communities:

- the use of digital hubs to connect Indigenous communities to health services and advice.
- the use of connectivity to develop a community television station in a remote Indigenous community to ensure the preservation of, and access to, culturally sensitive materials.
- the use of connectivity to enable 'digital storytelling' among Indigenous youth.

More generally, digitally connectivity has been shown to improve health outcomes. The Networked Society Institute has researched a number of applications of digital technologies to support access to, and delivery of, health services. For example:

- the use of virtual reality to support music therapy for quadriplegics.
- the use of virtual reality to support youth mental health.
- the provision of clinical support for patients with Chronic Obstructive Pulmonary Disorder (COPD).
- the provision of support for people living with Autism.

The use of digital technologies can support the wellbeing of workers confronted by automation of traditional roles and by new business models. For example, researchers have developed an online intervention to support the mental health and wellbeing of taxi drivers. The digital app speaks to the health needs of those in the industry and provides a practical health intervention.

Digital technologies can provide more opportunities to enhance the quality of life among those who encounter difficulties in accessing work. These technologies have been used to develop maps with

disability access and wheelchair friendly routes, and to reduce accidents and improve outcomes among the elderly and infirm. A further application is the use of 'Telework' to allow people with disabilities to remain active within the workforce.

Unequal access to digital skills, connectivity and technologies can also create new digital divides *within* communities. This is why it is important to ensure that infrastructure such as the NBN is extended to remote towns and communities. Universal service obligations around internet access are an important part of addressing the digital divide. A recent project on access to music education offers an example of the impact of digital connectivity for remote communities.