



Australian Mobile
Telecommunications
Association



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The Digital Economy: Opening up the conversation

Joint Industry Response by:

Australian Information Industry Association

Australian Mobile Telecommunications Association and

Communications Alliance

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Introduction

1.1 About the Australian Information Industry Association

The Australian Information Industry Association (AIIA) is the peak national body representing Australia's information technology and communications (ICT) Industry. Since establishing 35 years ago, the AIIA has pursued activities aimed to stimulate and grow the ICT Industry, to create a favourable business environment for our members and to contribute to the economic imperatives of our nation. *Our goal is to "create a world class information, communications and technology industry delivering productivity, innovation and leadership for Australia"*. <http://www.aiia.com.au>

1.2 About Australian Mobile Telecommunications Association

The Australian Mobile Telecommunications Association (AMTA) is the peak industry body representing Australia's mobile telecommunications Industry. Its mission is to promote an environmentally, socially and economically responsible, successful and sustainable mobile telecommunications industry in Australia, with members including the mobile Carriage Service Providers (CSPs), handset manufacturers, network equipment suppliers, retail outlets and other suppliers to the Industry. For more details about AMTA, see <http://www.amta.org.au>

1.3 About Communications Alliance

Communications Alliance is the primary telecommunications industry body in Australia. Its membership is drawn from a wide cross-section of the communications Industry, including carriers, carriage and internet service providers, content providers, search engines, equipment vendors, IT companies, consultants and business groups. Its vision is to provide a unified voice for the telecommunications Industry and to lead it into the next generation of converging networks, technologies and services. The prime mission of Communications Alliance is to promote the growth of the Australian communications industry and the protection of consumer interests by fostering the highest standards of business ethics and behaviour through Industry self-governance. For more details about Communications Alliance, see <http://www.commsalliance.com.au>

Overview

This submission is a joint response by the Australian Information Industry Association, the Australian Mobile Telecommunications Association and the Communications Alliance (the Associations). The three Associations collectively represent the bulk of Australia's \$100 billion ICT industry.

This submission takes a holistic view of technology and how it has and continues to change the Australian economy. Australia is undergoing seismic shifts throughout the economy from the rise of e-commerce and automation to mining and agricultural efficiencies. In many cases technology is moving faster than Government policy. In order to realise the benefits associated with technological change and support industry, Government needs a roadmap and the National Digital Economy Strategy is an integral component of that roadmap.

This submission addresses the Government's discussion paper, The Digital Economy: Opening up the conversation in 4 key sections and provides practical recommendations to address the issues raised. Importantly these recommendations recognise the need for not only Government to act, but that Industry and the community also have important roles to play to ensure we adapt to the changing future and that no one is left behind.

Section 1, The digital economy state of play addresses questions 1-4 and identifies:

- The importance of the innovation narrative
- Emerging technologies and how they may impact jobs

Section 2, Enabling and supporting the digital economy addresses questions 5-13 and finds that:

- 5G - next generation of mobile communications will be key element in supporting the digital economy
- Government is on the right track enabling opportunities for 5G by working closely with Industry and more can be done particularly around:
 - the spectrum reform agenda
 - the infrastructure deployment reform agenda and
 - Internet of Things (IoT) Security is imperative
- Standards and regulations must not throw up barriers to the deployment of new technologies and services
- Traditional approaches to security need to be questioned and new methods must be identified, tried and tested
- Australia needs a mature conversation on the risks associated with cyber security
- There is a need for an online digital identity
- Voluntary minimum standards, Industry codes, and guidelines, supported by an easily accessible toolkit for SMEs
- Secondments and exchanges needed to boost cyber security skills shortage

Section 3, Building on our areas of competitive strength addresses questions 14 -19 and finds that:

- Innovation requires the right tax incentives
- SMEs are too big to be left behind but need help to catch up
- Government procurement is a key lever for SME growth
- Building codes need to reflect the needs of the future
- Space is a strong high tech opportunity
- Other key growth industries

Section 4, Empowering all Australians through digital skills and inclusion addresses questions 20-22 and finds that:

- Digital inclusion requires digital literacy to be the new norm
- STEM is still an essential part of the conversation but non-STEM skills are just as important
- The need to support life-long learning is important
- Transitional arrangements for role displacement are required
- Australia's industrial relations frameworks need to keep up with technology changes to the market

Summary of recommendations

The Digital Economy state of play

This section addresses the following questions:

1. How are advances in digital technology changing the way you work, your Industry and your community?
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?
3. What is the role of Government in achieving that vision?
4. What are the key disruptive technologies or business models that you are seeing? What do you predict is on the horizon in five, 10, 20 years' time?

In response to Emerging technologies and how they may impact jobs:

The Associations recommend:

1. *Government develop a clear narrative on the effects of technology impact on jobs and how to manage it, including:*
 - *a clear strategy on preparing for a migration to a digital future that addresses policy responses to:*
 - i. *re-skilling and re-employment of displaced workers*
 - ii. *concerns about digital exclusion*
 - *the strategy should articulate a clear understanding of the types of roles that will be required and how to develop those skill sets and*
 - *the strategy must look beyond the horizon and develop frameworks that are adaptable and flexible to change, and take into account emerging technologies and needs.*

Enabling and supporting the Digital Economy - Digital infrastructure

This section addresses the following questions:

5. What communication services, and underlying data, platforms and protocols, does Australia need to maximise the opportunities of the digital economy?
6. What opportunities do we have to accelerate the development of technologies that will underpin Australia's digital economy?

In response to 5G - next generation of mobile communications will a key element in supporting the digital economy

The Associations recommend:

2. *The Federal Government continue its current support for the deployment of 5G in Australia, including through the 5G Working Group currently being established by the Minister for Communications and the Arts.*
3. *Government should identify platform interoperability as a key policy objective for Smart Cities in Australia, to ensure maximum efficiency in Smart City operating environments and avoid the risk of vendor 'lock-in'.*

In response to Government is on the right track enabling opportunities for 5G by working closely with Industry and more can be done

The Associations recommend:

4. *The Federal Government should continue to liaise closely with Industry on IoT security issues.*
5. *The agreed initiatives on IoT Security arising from the work of the CSAC should be explicitly included in Australia's national cybersecurity strategy and the activities funded under the existing budget underpinning that strategy.*
6. *The Government should continue to drive its reform agendas in relation to the management of radiocommunications spectrum and the deployment of network infrastructure to ensure that we have the capability to deploy fit for purpose 5G mobile networks.*

Enabling and supporting the Digital Economy - Standards and Regulation

This section addresses the following questions:

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?
8. What digital standards do we need to enable Australian businesses to participate in global supply chains and maximise the opportunities of the digital economy?

In response to Standards and regulations must not throw up barriers to the deployment of new technologies and services

The Associations recommend:

7. *Further study to determine the implications of national security measures for the development of IoT-based networks in Australia and whether any specific regulatory or legislative measures need to be modified. The Australian Communications and Media Authority should jointly undertake this work with Industry and the Department of the Attorney-General.*
8. *The Government should maintain an active watching brief on international IoT standardisation activities and be ready to work collaboratively with Industry in areas such as the ITU. The Associations would be happy to support/coordinate this effort from Industry*
9. *The Government and its agencies (i.e. ACMA) should continue to participate in relevant ITU forums in relation to international and regional planning for and harmonisation of radiocommunications spectrum.*

Enabling and supporting the Digital Economy – Trust confidence and security

This section addresses the following questions:

9. What opportunities do we have to build trust and community confidence through resilience to cyber threats, online safety and privacy?
10. What roles should Government, business and individuals play in protecting the community in a digital economy?
11. What integrity and privacy measures do we need to ensure consumers can protect their data?
12. What are barriers for business, particularly small business, in adopting cyber security and privacy practices?
13. What integrity measures do the Australian Government and the private sector need to take to ensure business-consumer transactions are secure?

In response to traditional approaches to security need to be questioned and new methods must be identified, tried and tested

The Associations recommend:

10. New defence techniques that are not constrained by legislation designed for the physical world (and IT security approaches designed to support it) are required to identify and protect against new types of cyber-attacks.
11. Streamlining security structures across Government, ensuring agencies and departments are not doubling up work and transparency is achieved. Specifically the Government could investigate:
 - the establishment of a single cyber security focussed department under a cyber security minister or
 - centralising cyber functions within the existing structure

In response to Australia needs a mature conversation on the risks associated with cyber security

The Associations recommend:

12. Government develop, through close consultation with Industry and the community, an agreed risk framework.
13. Industry to coordinate and collaborate on identifying risks and trade-offs in markets relevant to Industry. The Associations would be happy to support this endeavour.
14. Government integrity and privacy measures around cyber security including standards, should be developed against the agreed risk framework.

In response to the need for an online digital identity

The Associations recommend:

15. Government support and encourage the DTA in their development of a trusted online digital identity framework.
16. Industry experts to work closely with the DTA to ensure the framework is:
 - interoperable with existing online identity providers such as Australia Post and other state and territory systems;

- *open to free market players without unnecessary barriers; and*
 - *offers adequate cyber security measures.*
17. *Industry to communicate with Government and the community to explain the benefits and security of an online digital identity.*

In response to voluntary minimum standards, Industry codes, and guidelines, supported by an easily accessible toolkit for SMEs

The Associations recommend:

18. *Industry with Government support and funding, lead the development of an online tool to assist businesses assess their cyber security status and resilience.*

In response to Secondments and exchanges needed to boost cyber security skills shortage

The Associations recommend:

19. *Government and Industry to work together to implement a secondment/exchange program for cyber security experts. The UK Industry 100 initiative could be a model that can work in the Australian context.*

Building on our areas of competitive strength

This section addresses the following questions:

14. What is holding Australian businesses back in terms of benefiting from digital technologies?
15. What would help Australian businesses to embrace digital technologies?
16. What efforts are you or your organisation making to respond to digital transformation? Why?
17. What opportunities do we have to use digital technologies to improve linkages into export markets and global supply chains?
18. What opportunities do small and medium-sized businesses have to embrace digital innovation to drive customer value, improve their services and unlock their potential?
19. What are the key new growth industries that Australia should be tapping into? In what technologies and sectors should Australian businesses take the lead, and where should we be a 'fast follower' of international trends?

In response to innovation requires the right tax incentives

The Associations recommend:

20. *Government cease amending the R&D tax incentive to enable regulatory stability and shore up business confidence*
21. *Guidelines and assessments of the R&D tax incentive for IT to appropriately take into account the practicality of how R&D is conducted in a commercial IT environment.*

In response to SMEs are too big to be left behind but need help to catch up

The Associations recommend:

22. Government adopt clear policies and timeframes aimed at digital transformation of SMEs.
23. Government to investigate support for an online self – assessment tool that scores SME's readiness and capability to enter the global supply chain (based on the Entrepreneurs' Programme). Industry would be best placed to develop the tool with Government support.

In response to Government procurement a key lever for SME growth

The Associations recommend:

24. Procurement reforms that enable Government to procure directly with SMEs
 - The Associations support Government providing contracts to start-ups with clear deliverables over grant funding. This allows immediate benefit for both provider and Government agency/department by allowing access to tangible contracts to deliver work, it also signals to the market the Government is serious about fostering local Industry.
25. Government support rapid implementation of the recommendations from the DTA's procurement taskforce

In response to space a strong high tech opportunity

The Associations recommend:

26. Following from the current review of Australia's space Industry capability, the Federal Government should actively investigate, with Industry, opportunities to seed-fund the creation of start-up space-related ventures.

In response to other key growth industries

The Associations recommend:

27. Government support the growth of the IoT Industry in Australia as a priority. As part of this consider funding support to associations like the IoTAA who act in a similar capacity to Industry growth centres.

Empowering all Australians through digital skills and inclusion

This section addresses the following questions:

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?
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?
22. What opportunities do we have to ensure digital technology has a positive impact on the cultural practices and social relationships of Australians?

In response to digital inclusion requires digital literacy to be the new norm

The Associations recommend:

28. Active and practical strategies are developed to build Australia's digital literacy capabilities to prevent social and economic dislocation.

In response STEM still an essential part of the conversation but non-STEM skills are just as important

The Associations recommend:

29. Government, Industry and academia work together to:
- actively encourage young people to develop a more 'holistic' skills portfolio
 - Integrate jobs for tomorrows' skills into mainstream learning experiences
 - Investigate new skill acquisition and employment based learning pathways
 - Leverage engaging with the region and moving beyond Australian borders for experience, partnerships with regional neighbours on scholarship programs (Hamer / New Colombo Plan)^{1 2}

In response to the need to support life-long learning

The Associations recommend:

30. Government, Industry and academia work together to investigate more agile skill acquisition models aimed to support the re-skilling and up-skilling requirements of the future workforce, including lifelong learning approaches

¹ <http://www.business.vic.gov.au/support-for-your-business/grants-and-assistance/hamer-scholarships>

² <http://dfat.gov.au/people-to-people/new-colombo-plan/scholarship-program/pages/scholarship-program.aspx>

In response to transitional arrangements for role displacement

The Associations recommend:

31. *Government and Industry provide opportunities for workers to re-skill and up-skill to ensure potentially disrupted workers are not displaced or dislocated from the broader community.*

In response to Australia's industrial relations frameworks need to keep up with technology changes to the market

The Associations recommend:

32. *Industry to collaborate further with unions to support workers and allow workplaces to better understand technological developments and their potential impacts*

1. The Digital Economy state of play



This section addresses the following questions:

23. How are advances in digital technology changing the way you work, your Industry, and your community?
24. 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?
25. What is the role of Government in achieving that vision?
26. What are the key disruptive technologies or business models that you are seeing? What do you predict is on the horizon in five, 10, 20 years' time?

1.1 An important learning from the last Australian federal election is the importance of the innovation narrative

Technological change will affect the labour market. Technology disruption, as it has through history, will displace some industries, companies and workers, particularly workers that are vulnerable or older and lack the skills and flexibility to adapt.

The policy issues that arise to manage these are no different today than at any time in the past. The difference, however, is the pace of technology change coupled with the lag between the emergence of new technologies and the skills required to service them which demands a more urgent response.

Technologies including artificial intelligence (AI), robotics and machine learning (ML) are surfacing fresh anxieties. Claims that nearly half of our modern-day workforce will be replaced by these technologies ignores that technology has underpinned the modern economy for decades. This risks slowing adoption, undermining the global competitiveness of local industries – and industries ability to create new, sustainable jobs.

As such this section looks at emerging technologies and how they may impact jobs in a pragmatic way. Predictions about which jobs will exist in the future may not be perfect but we can speculate, with a level of confidence, about some of the new types of roles and skill sets that will be required as new technologies build momentum. In the present context, this is important.

Firstly, because we need to avoid unnecessary public anxiety about the impact of digital disruption on the availability of jobs. To build confidence about our future and the reality that is technological

disruption, the community needs a positive and realistic narrative that resonates with them about where we are heading and how we propose to 'get there' as a nation.

Secondly, by articulating the sorts of jobs that are emerging, or on the horizon, we are better placed to prepare. This includes anticipating the scope, scale and priority of skills required and how these can be developed and delivered.

1.2 Emerging technologies and how they may impact jobs

In AIIA's thought leadership paper, [Skills for today, Jobs of tomorrow](#) released earlier this year, they identified 10 key Industry sectors, those growing fastest and slowest, and examined recent labour market trends. The paper then makes separate longer-term predictions about new technology trends and assesses how these are likely to affect the labour market in specific industries.

Key findings in a few select high impact industries are outlined below. See the [thought leadership paper](#) for a full analysis.

Mining

- Technology trend: the mining industry has a long history of leveraging technology developments to extract resources more efficiently, in greater quantities and in a much safer manner. Recently, the use of digital tools and systems automation, including big data, data analytics and AI, have all led to improved decision-making and enhancements to competitiveness, mine output and efficiencies in extraction to shipping. Automation and autonomous vehicles, including remote controlled drilling tools, loaders, haulers and trucks are used to improve the efficiency and safety of mining operations. Augmented and virtual reality is enabling simulated training approaches, robotic remote control and the ability to visualise new mine sites and drilling techniques even before they exist.
- Job impact: the use of automation and data is driving a need for specialists in computing, systems and diagnostics, and the upskilling of maintenance people to service and maintain the technology. People skilled in validating and interpreting data are needed to challenge traditional and/or existing operational and system behaviours. Trades jobs and maintenance workers will need to apply their skills to new systems and equipment. While over time trucks and machinery will be replaced by autonomous vehicles, robots and automated tools, upskilling workers to supervise fleets of autonomous vehicles or remote machines will provide new opportunities for some.

Agriculture

- Technology trend: the proliferation of on-farm sensor technology using IoT, enables farmers to remotely monitor and capture data on soil moisture, crop growth and livestock feed levels. These can be processed in real time to analyse conditions and aid decision making to boost crop productivity and yields while also reducing on-farm costs. Drones collect farming and environmental data as well as undertake controlled releases of herbicides
- Job impact: while these developments change the nature of modern day farming they also drive potential for new employment opportunities and arguably, will attract new types of people into this career path. Current roles such as service technicians and mechanics will likely need to evolve their traditional skills. Roles such as drone operators, IoT sensor installers and maintenance workers will require a level of digital skills, but these are not highly technical roles. While IoT, RFID technology and AI will assist livestock management and food provenance, workers will still need to oversee production and execute and supervise crop and property management activities.

Health

- Technology trend: the emergence of wearable devices and AI is empowering patients to self-manage their health and wellbeing. New technologies in surgeries to augment precision medical tasks such as stitching small wounds to reduce scarring are also available. Other trends include automation in clinical data, predictive diagnostics and robots assisting in areas from nursing to hospital logistics to pharmaceutical dispensary.
- Job impact: roles such as case managers, nursing assistants and aged care assistants will grow alongside the aging population – irrespective of technology change. These are not technical jobs and do not require a university degree. However, in future they will be aided by data from wearable technologies and other sources. Digital literacy and the ability to use technical devices and equipment will be an important part of these and many other jobs.
- As roles such as billing managers, prescription dispensers and front office clerks decline with the integration of new technologies and software tools, workers will be freed up to transition into more case work roles, directly helping and interacting with patients and carers.

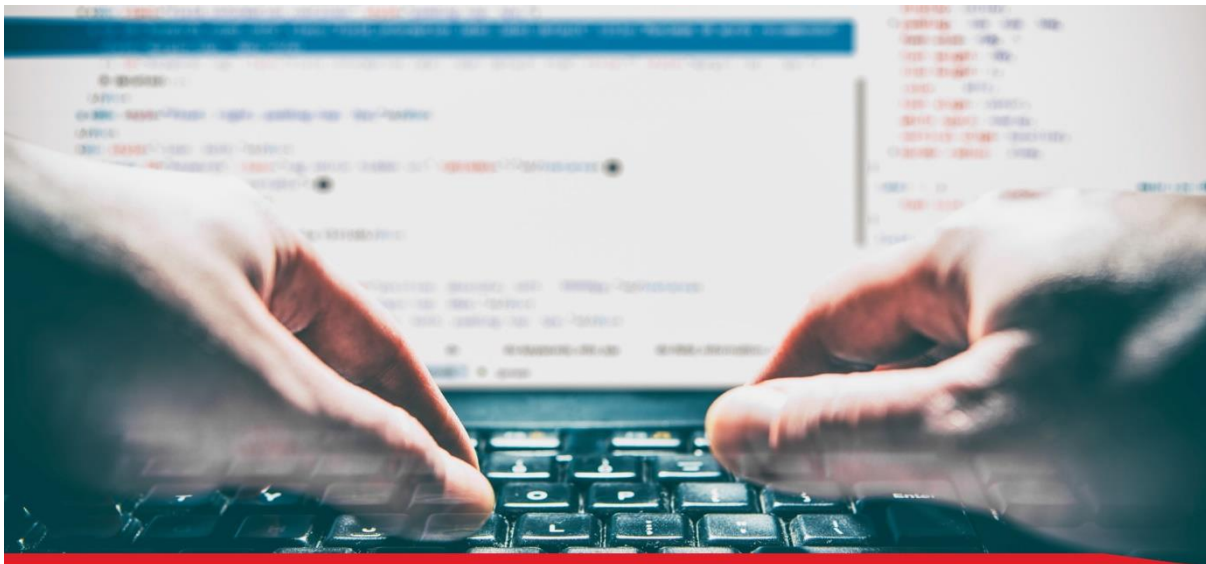
Banking

- **Technology trend:** The rise of cryptocurrencies, such as bitcoin combined with blockchain technology is enabling end to end digital financial transactions from anywhere around the world in real time and without traditional intermediaries such as banks. Banks are also adopting new generation AI to automate routine operations, wealth management, algorithmic trading and risk management.
- **Job impact:** with the rise of cryptocurrencies and blockchain there are opportunities for sales roles that explain the benefits and opportunities of these new technologies. These don't require technical skills but the people and communications skills to identify opportunities and sell them. Those who prefer numbers might move into fraud detection and investigation. This is a strong growth area given the pervasiveness of online transactions.

The Associations recommend:

1. *Government develop a clear narrative on the effects of technology impact on jobs and how to manage it, including;*
 - *a clear strategy on preparing for a migration to a digital future that addresses policy responses to:*
 - i. *re-skilling and re-employment of displaced workers*
 - ii. *concerns about digital exclusion*
 - *the strategy should articulate a clear understanding of the types of roles that will be required and how to develop those skill sets and*
 - *the strategy must look beyond the horizon and develop frameworks that are adaptable and flexible to change, and take into account emerging technologies and needs.*

2. Enabling and supporting the Digital Economy



2.1 Digital infrastructure

This section addresses the following questions:

27. What communication services, and underlying data, platforms and protocols, does Australia need to maximise the opportunities of the digital economy?
28. What opportunities do we have to accelerate the development of technologies that will underpin Australia's digital economy?

5G - next generation of mobile communications will be key to fast tracking the digital economy

5G is the next generation of mobile communications networks and it is anticipated to enable a fully and seamlessly connected society and economy. It will deliver substantial improvements in the speed, latency and reliability of mobile networks in order to meet the ever increasing demand for mobile broadband (MBB).

5G will be an evolution that builds on 4G/LTE (Long Term Evolution) mobile networks and continues the convergence between fixed and mobile services.

Up until late last decade, technologies tended to be purpose-built for particular applications so that various specific, often proprietary, technologies addressed the varying requirements of private mobile radio for business operations, public mobile phones for voice communications, fixed wireless access, etc. The advent of the smartphone and LTE technology has resulted in the lines between these applications becoming increasingly blurred, leading to technological convergence, in particular, between fixed and mobile services.

For example, WiFi, previously used to communicate with fixed (or at best, nomadic) user devices only, can now connect to smartphones which are truly mobile devices. LTE is a cellular network technology that can be used to both connect mobile phones in motion, as well as fixed user terminals for broadband access, not to mention also satisfy the requirements of Government radio communications previously completely reliant only on narrowband private land mobile radio networks for voice.

In future 5G networks, the convergence of fixed and mobile services is expected to evolve further. For example, through technological advances such as network slicing—allowing a physical network to be divided into multiple virtual networks (slices), each tailored to support particular types of applications, and supported by 5G’s envisioned scalable numerology—and adaptive antenna beamforming and tracking—designed to support both stationary and moving devices.

5G is more than just the Internet of Things (IoT) or faster download speeds – it is smart, connected communities – where transport systems, infrastructure and services such as health and education are all supported by mobile communications technology. Building such a fully connected ‘mobile life’ will require radical change to the way we use mobile broadband and support applications not previously dependent upon mobile connectivity.

IoT is an evolution of Machine to Machine (M2M) applications that expands the interconnectivity from direct communication links to IP networks. IoT is an application that will be further enabled and expanded by 5G, according to 5G Americas:

“The vision of 5G is that the massive IoT market will explode with billions of devices and sensors that represent a digital representation of our real world, driven by low cost devices, long battery life, coverage everywhere, and innovative business applications. The promise of 5G is that it will be possible to realize critical IoT applications, which require real-time control and automation of dynamic processes in various fields such as vehicle-to-vehicle, vehicle-to-infrastructure, high-speed motion, and process control. Critical parameters to enable the performance required are network latency below milliseconds and ultra-high reliability and both are intrinsic components of the 3GPP work to define the new radio interface for 5G, NR. The 5G network architecture is being designed to cater for both IoT scenarios.”

5G promises to be a comprehensive advance in mobile technology – not just about millimetre wave mmW, antenna beamforming, massive machine-type communications (massive MTC), or super-high download speeds—it will need to be about all these features being provided in a flexible manner depending on service requirements.

The International Telecommunications Union (ITU) has a working party (ITU-R Working Party 5D) tasked with developing the standards and technical requirements for 5G. Based on their work so far, 5G is expected to deliver:

- extreme peak data rates (20 Gbps downlink, 10 Gbps uplink)
- extreme user experienced data rate (1 Gbps for hotspot, 0.1 Gbps for wide area coverage)
- massive connectivity (1,000,000 connections per square kilometre for massive MTC)
- ultra-low end-to-end latency (1 ms in the user plane)
- high reliability (99.999% for mission-critical “ultra-reliable” communications)
- mobility support for high-speed terminals (500 km/h)

In the Smart Cities space, Australia needs to ensure that the plethora of available and emerging IoT platforms that will or are already being deployed are able to communicate and coordinate with one another, to avoid ‘vendor-lock-in’ and to ensure a seamless connected urban environment that can reap the full potential of IoT applications to enhance the lives of citizens.

The relevant work stream within the Internet of Things Alliance Australia (IoTAA), an interest body for the use of IoT, has already identified more than 40 different IoT platforms that are available to those wishing to create a Smart City environment. Government at all levels need to be aware of the need to ensure interoperability of platforms.

One solution is the Hypercat protocol, originally developed in the UK. Hypercat is a Global Alliance and standard (PAS 212) driving secure and interoperable Internet of Things (IoT) for Industry and cities.

The Hypercat specification allows Internet of Things (IoT) clients to discover information about IoT assets over the web. With Hypercat developers can write applications that will work across many servers, breaking down the walls between vertical silos.

The Associations recommend:

2. *The Federal Government continue its current support for the deployment of 5G in Australia, including through the 5G Working Group currently being established by the Minister for Communications and the Arts.*
3. *Government should identify platform interoperability as a key policy objective for Smart Cities in Australia, to ensure maximum efficiency in Smart City operating environments and avoid the risk of vendor 'lock-in'.*

Government is on the right track enabling opportunities for 5G by working closely with Industry and more can be done

The Government's Direction Paper, "*5G – Enabling the future economy*"³ – sets the framework for ongoing dialogue between Industry and Government departments, establishing a whole of Government approach to ensuring that regulatory barriers to the roll-out of 5G are minimised.

The Directions Paper also sets out immediate actions by Government that will enable the timely introduction of 5G in Australia that the Associations strongly support, including:

- Making spectrum available in a timely manner
- Actively engaging in the international standardisation process
- Streamlining arrangements to allow mobile carriers to deploy infrastructure more quickly, and
- Reviewing existing telecommunications regulatory arrangements to ensure that they are fit for purpose.

Other areas where Government support would be welcomed include:

- Participation in key international forums in relation to spectrum requirements for 5G e.g. ACMA is hosting the 3rd Meeting of the APT Conference Preparatory Group for WRC-19 (APG19-3) on 12-16 March 2018 in Perth. We note that this is also a recommended immediate action outlined in the Government's Direction Paper – 5G – enabling the future economy.
- Industry would also welcome stronger Government participation at the annual Mobile World Congress, held in Barcelona each February – a huge conference and exposition that tends to be a focal point for the latest in technology, innovation and regulation at the leading edge of digital economies.

Spectrum reform agenda

Spectrum and deployment related policy and regulatory settings are critical inputs to support the implementation of 5G. Timely allocation and management of limited spectrum resources (including consideration of any incumbents), as well as efficient roll-out of physical infrastructure, requires thoughtful consideration and timely decision-making by policy makers to ensure that the benefits of 5G are fully realised.

³ Department of Communications and the Arts, [5G-enabling the future economy](#), Oct 2017.

Industry is already preparing for 5G and investment decisions are being made now. It is imperative that there is certainty around the future availability of spectrum resources as well as the timing of spectrum allocations to provide certainty for the requisite long-term investment decision-making processes.

The Associations note that ACMA has commenced a program of preparatory work to facilitate access to spectrum for 5G and IoT technologies and has expressed its commitment to continuing to support Industry in the development of 5G, including facilitating trials.

We also recognise that ACMA—via its contingency planning model for consideration of additional spectrum for mobile broadband services—is prepared to monitor and respond to early 5G developments outside of the WRC-19 process, including rapid progression of bands to subsequent stages of the mobile broadband work program. Taking into account the increasing global interest in the 3.6 GHz band for early 5G deployment, the release of the discussion paper⁴ on the band is an example of a near-term ACMA action supporting early consideration of spectrum for 5G in Australia.

The Spectrum Review reform process being undertaken by the Department of Communications and the Arts (DoCA), working closely with the ACMA, is critical for spectrum planning and continued investment related to 5G.

The Associations believe that the reforms proposed as an outcome of the Spectrum Review should liberalise the licensing framework so that both existing and future spectrum licences are more flexible for licence holders.

Infrastructure deployment reform agenda

The legislative and regulatory framework governing the deployment of mobile telecommunications infrastructure (Carrier powers and immunities) is in need of urgent reform and Industry is working closely with the DoCA on proposed amendments to ensure that the framework is fit for purpose and does not hinder the timely and efficient roll-out of infrastructure to support 5G.

IoT Security Imperative

In order to accelerate the development of technologies to underpin Australia's digital economy, it is equally important to guard against factors that will undermine the acceptance of those same technologies

As countless millions of new connected devices, sensors and applications are rolled out it is vital that a framework of trust is developed with businesses and consumers that help all users embrace the new technologies without fear that their privacy and/or commercial interests are being compromised.

Establishing and maintaining security is a priority. If users do not have confidence in platforms and applications, they will shy away from the transformative opportunities that these new developments can offer.

Much work is underway on these issues within the IoTAA (which has developed an IoT Security Strategy and a number of Industry guidelines).

Similarly, the Prime Minister's Cyber Security Advisory Council (CSAC) is tackling, among other things, the question of whether Australia can introduce an accreditation system for connected devices, to help consumers choose products that offer both value and resilience against external attack or compromise.

The Associations recommend:

⁴ ACMA Discussion paper - http://www.acma.gov.au/theACMA/future-use-of-the-1_5-ghz-and-3_6-ghz-bands

4. *The Federal Government should continue to liaise closely with Industry on IoT security issues.*
5. *The agreed initiatives on IoT Security arising from the work of the CSAC should be explicitly included in Australia's national cybersecurity strategy and the activities funded under the existing budget underpinning that strategy.*
6. *The Government should continue to drive its reform agendas in relation to the management of radiocommunications spectrum and the deployment of network infrastructure to ensure that we have the capability to deploy fit for purpose 5G mobile networks.*

2.2 Standards and Regulation

This section addresses the following questions:

29. What opportunities do we have in standards development and regulation to:

- enable digital entrepreneurship, innovation and trade?
- mitigate the risks associated with digital disruption?

30. What digital standards do we need to enable Australian businesses to participate in global supply chains and maximise the opportunities of the digital economy?

Standards and regulations must not throw up barriers to the deployment of new technologies and services

There will be a continuing need to look at how to ensure that the Australian regulatory framework – which was not designed with the new challenges inherent in IoT in mind – does not throw up barriers to the deployment of new technologies and services.

There are questions, for example as to whether/how the various regulatory and legislative requirements imposed on traditional networks – in areas such as lawful interception, infrastructure protection and data retention – apply to IoT-based networks, applications and services. For the moment, there are many more questions than answers in areas such as these.

Also see reference to Hypercat in response to Q.5, to risk mitigation in response to Q.6 and a risk framework in response to Q.13

There are already many standards in place to facilitate the connection of IoT sensors to networks and this is not an area where Australia should focus its standardisation or regulatory efforts.

We need to be aware of and willing to contribute positively to - through Standards Australia and other bodies – international IoT standardisation activities in the ITU and elsewhere.

The Associations recommend:

7. *Further study to determine the implications of national security measures for the development of IoT-based networks in Australia and whether any specific regulatory or legislative measures need to be modified. The Australian Communications and Media Authority should jointly undertake this work with Industry and the Department of the Attorney-General.*
8. *The Government should maintain an active watching brief on international IoT standardisation activities and be ready to work collaboratively with Industry in areas such as the ITU. The Associations would be happy to support/coordinate this effort from Industry*
9. *The Government and its agencies (i.e. ACMA) should continue to participate in relevant ITU forums in relation to international and regional planning for and harmonisation of radiocommunications spectrum.*

2.3 Trust, Confidence and Security

This section addresses the following questions:

31. What opportunities do we have to build trust and community confidence through resilience to cyber threats, online safety and privacy?
32. What roles should Government, business and individuals play in protecting the community in a digital economy?
33. What integrity and privacy measures do we need to ensure consumers can protect their data?
34. What are barriers for business, particularly small business, in adopting cyber security and privacy practices?
35. What integrity measures do the Australian Government and the private sector need to take to ensure business-consumer transactions are secure?

Traditional approaches to security need to be questioned and new methods must be identified, tried and tested

The cyber world does not conform to traditional borders, gateways and “perimeter” security like the physical environment does. Cyber security is not ‘static’. Addressing the modern cyber challenge cannot rely on existing approaches to security, legislation, and policy.

With the world migration to a digital everything future and with IoT on our doorstep, security will be at the forefront of policy and strategy for Governments and Industry around the world. How one thinks about security and the traditional challenges security represents to Government and Industry are no longer the norm. We have entered a new realm where the fundamental questions of how to enforce security policies and ensure safety are being challenged. Government and Industry can work together and through advances in technology such as blockchain, can change the security status quo. As security underpins all aspects of our digital society a coordinated approach led by the executive branch needs to be adopted.

The many faces of cyber responsibility in Government is both confusing and inefficient

By having cyber security roles that span across many Government departments, it is difficult for Industry to provide holistic support. This siloed approach results in agencies being protective of their systems and information, and results in a fragmented view of the cyber eco-system. Government needs to move to a single consolidated data and analytics platform to become more agile and responsive to cyber-security threats.

Coordinated funding across Government agencies and departments would assist, as currently it appears funding is spread too thinly across too many agencies. This results in wastage, lack of reuse (i.e. agencies trying to build their own system), and limited information sharing.

A more holistic, national cyber security structure, supported by clear direction and strong leadership is required in response to the issues. The newly established Department of Home Affairs goes some way to addressing these issues but does not have a specific focus on cyber security nor does it include all the departments/agencies that have portfolio responsibility in this space.

An important component to centralisation would be to establish an Industry representative panel including consumer groups and academics. The Associations would be happy to support this panel through coordinating expertise and time.

To this end, the Government could investigate the establishment of a single cyber security focussed department under a cyber security minister or centralising cyber functions within the existing structure.

The Associations recommend:

10. *New defence techniques that are not constrained by legislation designed for the physical world (and IT security approaches designed to support it) are required to identify and protect against new types of cyber-attacks.*
11. *Streamline security structures across Government, ensuring agencies and departments are not doubling up work and information sharing is achieved. Specifically the Government could investigate:*
 - *the establishment of a single cyber security focussed department under a cyber security minister or*
 - *centralising cyber functions within the existing structure*

Australia needs a mature conversation on the risks associated with cyber security

Risk can never be fully eliminated and should be managed proportionately. Dealing with risk is not a matter of eliminating all uncertainties, but of setting clear limits upon the scope for accidents, attacks and errors.

In thinking about cyber security, we need to decide how much risk is acceptable based on the relative trade-offs. The answer does not lie in an absolutist rejection of risk, but a clear policy as to where on the spectrum of risks one decides to draw a line. Government cyber security integrity and privacy measures, including mandatory standards should be based on the risk framework.

The Associations recommend:

12. *Government develop, through close consultation with Industry and the community, an agreed risk framework.*
13. *Industry to coordinate and collaborate on identifying risks and trade-offs in markets relevant to Industry. The Associations would be happy to support this endeavour.*
14. *Government integrity and privacy measures around cyber security including standards, should be developed against the agreed risk framework.*

The need for an online digital identity

The Associations support an online environment where individuals and organisations are able to trust each other because they follow agreed upon standards, policies and processes to obtain and authenticate their digital identity and the digital identity of devices.

There are two reasons for this:

- Technology will change the way business is done. For example, machine learning and data analytics will lead to more data led decision making. Robotics and automation will change how we perform our work. Until we can communicate end to end online in a seamless way that identifies and authenticates our digital identity, we will not fully recognise the benefits of the fourth industrial revolution.
- Currently individuals and Small to Medium Enterprises (SMEs) interact with 100s and 1000s of websites with varying levels of security. Individuals and SMEs are regularly identified as the 'weakest link' and most vulnerable to cyber-attacks. Traditionally we've attempted to address this by trying to change behaviour through education. This has proven difficult as people are time poor and unaware of the risks.
- We can also address the issue of cyber resilience though minimising the impact of cyber-attacks when they occur. This could be achieved for example through an online digital identity network where accounts can be linked and closed on reporting and authentication of ID.

The best solution is not one or the other – but pulling multiple levers to ensure maximum outcomes relative to the costs.

The Digital Transformation Agency (DTA) is currently consulting on a draft trusted digital identity framework. The Associations strongly support Government's role in setting the framework. It's important that Government works closely with its state and territory counterparts to ensure the model is interoperable and we don't end up with different rail gauges. Consultations and drawing on Industry expertise is also a must.

One of our current concerns with the DTA's framework is having an 'exchange' system where it's not clear that the states and territories, and existing online identity providers e.g. Australia Post, can engage without having to build significant additional infrastructure. This has implications for the speed of fully implementing a federated system and for users, it potentially means having to go through multiple doors to engage.

The Associations recommend:

15. *Government support and encourage the DTA in their development of a trusted online digital identity framework.*
16. *Industry experts to work closely with the DTA to ensure the framework is:*
 - *interoperable with existing online identity providers such as Australia Post and other state and territory systems;*
 - *open to free market players without unnecessary barriers; and*
 - *offers adequate cyber security measures.*
17. *Industry to communicate with Government and the community to explain the benefits and security of an online digital identity.*

Voluntary minimum standards, industry codes, and guidelines, supported by an easily accessible toolkit for SMEs

There is strong support for set minimum standards, industry codes and guidelines. The issue is not that these require development, but rather businesses need guidance in respect of which of these will best meet their needs.

AIIA has already recommended in various forums that the Australian Government release a comprehensive and easily accessible toolkit that provides advice on available options and how they should choose between them.

The NIST Cyber Security Framework, the Internet of Things Security Guideline and IoTAA's Good Data Practice: A Guide for Business to Consumer IoT Services for Australia are good examples of voluntary, Industry developed documentation. The ASD Strategies to Mitigate Targeted Cyber Intrusions, is a good example of Government developed guidance.

Efforts to identify and set requirements via international standards, as opposed to creating localised ones would streamline procurement and help enable Government and other Australian businesses to adopt leading security solutions.

Regardless of the type of guidelines/codes agreed, a simple online tool could be developed to also assist businesses assess their cyber security status and resilience. The tool could identify both vulnerabilities and risks as well as remedial strategies.

The Associations recommend:

18. Industry with Government support and funding, lead the development of an online tool to assist businesses assess their cyber security status and resilience.

Secondments and exchanges needed to boost cyber security skills shortage

The UK's approach for its new National Cyber Security Centre recognises that Government "cannot protect businesses and the general public from the risks of cyber-attack on its own". In response it has put in place the Industry 100 initiative which will facilitate 100 temporary places given to private sector staff to work in the centre.

The Industry 100 approach aims to capture the collective knowledge and experience from many domain experts, and leverage these to develop appropriate cyber security policies, tools and techniques. It facilitates Government implementing more practical cyber security measures that businesses and the community can use/apply. It also ensures that the views/challenges of business and the community are captured and contribute to cyber defence processes.

The Associations recommend:

19. Government and Industry to work together to implement a secondment/exchange program for cyber security experts. The UK Industry 100 initiative could be a model that can work in the Australian context.

3. Building on our areas of competitive strength



This section addresses the following questions:

36. What is holding Australian businesses back in terms of benefiting from digital technologies?
37. What would help Australian businesses to embrace digital technologies?
38. What efforts are you or your organisation making to respond to digital transformation? Why?
39. What opportunities do we have to use digital technologies to improve linkages into export markets and global supply chains?
40. What opportunities do small and medium-sized businesses have to embrace digital innovation to drive customer value, improve their services and unlock their potential?
41. What are the key new growth industries that Australia should be tapping into? In what technologies and sectors should Australian businesses take the lead, and where should we be a 'fast follower' of international trends?

3.1 Innovation requires the right tax incentives

One of the inhibitors to investment in ICT innovation in Australia is the constant changes to the Research & Development (R&D) tax incentive. Most recently was the 2016 R&D Tax Incentive review, before that in the 2014-15 Budget, the Government announced that the refundable and non-refundable tax offset rates would be reduced by 1.5 percentage points, from 45% to 43.5% and from 40% to 38.5%, respectively. On 12 February 2015, Parliament enacted the Tax Laws Amendment (Research and Development) Act 2015, which introduced a limit of \$100 million on the amount of R&D expenditure that companies can claim at the standard offset rate. For amounts above \$100 million, companies will be able to claim a tax offset at the company tax rate. These constant changes to policy erode business confidence and planning for R&D activities.

Separately, current R&D arrangements are not sufficiently supportive of digital related R&D. Because of the way in which R&D is done in the IT space and the lack of understanding of how R&D is done by assessors, we are seeing a large proportion of R&D in technology being missed. This sends the opposite message to Industry and stymies' innovation.

- The R&D incentive is an incentive for 'commercial organisations' not research institutes (whose sole purpose is arguably one of discovering 'new knowledge' - a requirement for the incentive). For commercial organisations undertaking software R&D, they seek to exploit 'new knowledge' through trade secrets and embodiment with firmware, designs and source code, and increasingly wrapping the new knowledge within a new service capability or offering thereby protecting its core IP (and knowledge) from being made publicly available.
- Coupled with the speed that the software market is evolving, it is challenging to understand what is the base level of 'knowledge' in a particular IT domain. Taking into consideration sectoral differences and commercial practices, it would be logical to conclude that if a taxpayer can demonstrate the above statement to the best of their Industry and domain knowledge it should be sufficient to satisfy the legislative tests.

The Associations recommend:

20. *Government cease amending the R&D tax incentive to enable regulatory stability and shore up business confidence*
21. *Guidelines and assessments of the R&D tax incentive for IT to appropriately take into account the practicality of how R&D is conducted in a commercial IT environment.*

3.2 SMEs are too big to be left behind but need help to catch up

The vast majority (over nine in ten) of Australian businesses are small businesses. They account for 33 per cent of Australia's GDP, employ over 40 per cent of Australia's workforce, and pay around 12 per cent of total company tax revenue.⁵

However less than 50% of Australian businesses have a website; 56% place orders online; and only 33% receive orders online (ABS, Business Use of ICT 2016).

Importantly digital transformation of SMEs is both a productivity and employment issue. Many owners start up their business in order to give themselves and their families' jobs. Discussions about digital transformation of SMEs has been around for 10+ years. Although a new generation of SMEs are emerging that are more digitally savvy and engaged, transitional arrangements to speed up digitalisation need to be in place now so that existing SMEs are not displaced.

Without a sense of urgency and clear time frame the Government risks missing the boat on safeguarding that SMEs remain the strong engine of employment in our economy.

Last year an Industry supply chain tool for ICT SMEs was developed as part of the Commonwealth Government Entrepreneurs' Programme. The tool is essentially a survey that assesses and provides a score on a SME's readiness and capability to enter the global supply chain.

Similar tools are also available for other sectors. The problem is that access to the tool is only available if SME's meet certain monetary thresholds and other requirements. The assessment process itself is also half a day long and facilitated by an expert Industry advisor.

To allow greater access to what is considered a valuable Industry support tool, Government could investigate supporting a truncated online self – assessment version.

The Associations recommend:

22. Government adopt clear policies and timeframes aimed at digital transformation of SMEs.
23. Government to investigate support for an online self – assessment tool that scores SME's readiness and capability to enter the global supply chain (based on the Entrepreneurs' Programme). Industry would be best placed to develop the tool with Government support.

⁵ http://www.asbfeo.gov.au/sites/default/files/Small_Business_Statistical_Report-Final.pdf

3.3 Government procurement a key lever for SME growth

While there are usually SME components to Federal Government tenders with the prime contractor (prime) and subcontract arrangement – in practice Industry SMEs advise that benefits are currently not flowing through.

Going through a prime for a closed panel (as part of a tender process) adds anything from 16.85% - 26.85% to the running costs of the SME. This immediately makes them less cost competitive. For example:

- SMEs are charged anywhere from 10-20% for access to the panel by the prime. In one case, given the SME was niche, they were already known to the agencies and 10-20% mark-up was purely to have a company on the panel put their logo on the SME's submission (and to have access to the Agency).
- In the ACT, SMEs are charged payroll tax on the overall revenue generated from the Government work - because the ACT Government considers the SME an employee to the prime.
- SME's compromise their IP - handing it over to the prime who is on the panel and who they are required to sub-contract to.

These issues are being looked at by the DTA as part of the procurement review.

The Associations recommend:

24. Procurement reforms that enable Government to procure directly with SMEs
 - The Associations support Government providing contracts to start-ups with clear deliverables over grant funding. This allows immediate benefit for both provider and Government agency/department by allowing access to tangible contracts to deliver work, it also signals to the market the Government is serious about fostering local Industry.
25. Government support rapid implementation of the recommendations from the DTA's procurement taskforce

3.4 Building codes that reflect the needs of the future

Another area that warrants attention is the National Construction Code. The Australian Building Codes Board (ABCB) has recently, for the second time, rejected a submission from Communications Alliance, designed to insert into the National Construction Code a requirement that all new buildings constructed in Australia provide for communications and cabling pathways and ducts, to help provide for more efficient and cost-effective connection to the NBN and to other digital services in future. This seems to us a short-sighted approach – we believe that every new construction in Australia needs to be “digital economy-ready”, to avoid inevitable delay, re-work and expense in future as modifications are made. In the first instance a simple requirement to ensure that every garage and car-space has a mains power supply will prove vital as the proportion of electric-powered vehicles skyrockets in coming years.

3.5 Space a strong high tech opportunity

The Space Industry stands out as an area of strong high-tech opportunity for Australia and is being explored in the current DIIS Review of Australia's Space Industry Capability.

The global space Industry grew at a compound rate of 9.52% per annum from 1998 to 2015, but Australia's is presently heavily under-represented in terms of its global share.

In a recent submission, Communications Alliance argued that other areas of significant new opportunity for the Australian space sector include:

- development of leading edge satellite-based resiliency solutions (in both space segment and ground segment) in the broadcasting, broadband, emergency communications and disaster recovery spaces. (See break-out information on the recent initiative by O3B and Project Loon to assist Peruvians hit by a flood disaster.)
- next-generation compression equipment to further boost the throughput and flexibility of commercial satellite fleets
- the greater use of satellite backhaul to optimise the rollout of 5G mobile networks Satellite backhaul is very efficient for high-speed low-volume use cases. 5G networks move many capabilities to the network edge and will feature more and smaller network cells, creating potential for greater satellite involvement and
- similarly, IoT networks will primarily be driven by low-bandwidth, high-volume transmission. Where latency is not critical, opportunities will emerge for geostationary satellites. Where low latency is at a premium, low-orbit satellites and sub-orbital high-altitude networks may also play an important role.

The Associations recommend:

26. Following from the current review of Australia's space Industry capability, the Federal Government should actively investigate, with Industry, opportunities to seed-fund the creation of start-up space-related ventures.

3.6 Other key growth industries

Other Industry sectors in which Australia has an existing combination – in varying proportions – of natural advantage and the ability to generate digitally-enabled growth, include:

- transport and logistics;
- agriculture;
- mining/resources;
- utilities;
- water; and
- smart cities.

Note this closely aligns with the Government's Industry growth centre sectors which we support. They include:

- Advance manufacturing
- Cyber security
- Food and agribusiness
- Medical Technologies and Pharmaceuticals;
- Mining Equipment, Technology and Services; and
- Oil, Gas and Energy Resources.

We would also add IoT as a big growth opportunity. Communications Alliance in late 2014 identified the need to create in Australia a globally aware, collaborative IoT 'Community' encompassing Industry, Government, Academia and Consumers, lest the nation fall further behind in the realisation of the benefits flowing for the digital economy.

In early 2015 they created an IoT Think Tank within Communications Alliance to pursue this objective. The project blossomed, eventually becoming the IoTAA, which now boasts more than 300 organisations and 600 individuals pursuing the benefits of IoT for present and future Australians.

The Associations recommend:

27. Government support the growth of the IoT industry in Australia as a priority. As part of this consider funding support to associations like the IoTAA who act in a similar capacity to Industry growth centres.

4. Empowering all Australians through digital skills and inclusion



This section addresses the following questions:

42. 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?
43. What opportunities do we have to bridge the 'digital divide' and make the most of the benefits that digital technologies present for social inclusion?
44. What opportunities do we have to ensure digital technology has a positive impact on the cultural practices and social relationships of Australians?

4.1 Digital inclusion requires digital literacy to be the new norm

Studies have consistently found that equipping people with digital skills which enable participation in the labour market can help to deliver real economic and social benefits whilst also reducing unemployment, driving productivity and growth, and contributing to broader social cohesion.⁶

Irrespective of where the change takes us, one thing is certain: universal digital literacy must be the new norm. Without basic digital competencies, a person will not have the skills to negotiate the digitally connected world that is now a reality. They will not have the skills, information or communication networks to negotiate opportunities and as a result they will have fewer job prospects and be more exposed to social and economic exclusion. Their disadvantage will be compounded by a corresponding reduction in access to Government services.⁷

Importantly, this is not a job displacement issue but the inevitable reality of operating in a modern, global and digital economy. It is as essential as numeracy and literacy is to everyone participating in a post-industrial revolution economy. Digital inclusion and the future economy will require universal participation from young and old alike. For Australian's that have not studied a Science, Technology,

⁶ UK and others https://doteveryone-prod.s3-eu-west-1.amazonaws.com/uploads/The%20economic%20impact%20of%20digital%20skills%20and%20inclusion%20in%20the%20UK_Final_23_11_15.pdf

⁷ ACOLA, 2015 http://acola.org.au/wp/PDF/SAF05/SAF05_Report_web_17Sept.pdf

Engineering and Mathematics (STEM) related discipline the focus for them will be on gaining at least a basic understanding.

The Associations recommend:

28. Active and practical strategies are developed to build Australia's digital literacy capabilities to prevent social and economic dislocation.

4.2 STEM still an essential part of the conversation but non-STEM skills are just as important

The focus on STEM training while not new, is crucial to building a 21st century knowledge based economy, underpinned by data, digital technologies and innovation – key ingredients for growth.

The process of learning STEM, is just as important as the content itself. It teaches students how to analyse problems and then work to correct and overcome them. It brings real world application and hands on experimentation to the learning process and instils creativity by encouraging students to see problems and solutions in new and different ways.

Technical proficiency alone will not be sufficient. While skills in STEM remain critical, the longer-term focus will move to a new mix of skills that combine workplace, applied knowledge, people and personal skills – with an emphasis on creativity, flexibility, tolerance of ambiguity, social intelligence and personal resilience and agility.

We know that even across the Associations membership of technology leaders, where STEM skills are a premium, businesses want more than hard technical skills.⁸

Enterprise skills such as complex and creative problem solving, innovative thinking, communication skills, teamwork and collaboration and an understanding of the business and Industry context are what many of Association members are looking for from new employees.

This is consistent with analyst predictions that more technical and cognitive skills such as creativity, reasoning and complex problem solving, combined with social skills (influencing, persuasion, emotional intelligence and the ability to teach others) and processing skills (active listening and critical thinking) are becoming “core” across many industries.^{9 10}

The Associations recommend:

29. Government, Industry and Academia work together to:

- actively encourage young people to develop a more 'holistic' skills portfolio*
- integrate jobs for tomorrows' skills into mainstream learning experiences*
- investigate new skill acquisition and employment based learning pathways and*

⁸ Survey undertaken by AIA with members 2015

⁹ Infosys, Amplifying Human Potential 2017 http://images.experienceinfosys.com/Web/Infosys/%7B8adf71d4-ce0c-48e1-8299-83e1dbd8c0c4%7D_Infosys-Amplifying-Human-Potential-new.pdf?elqTrackId=dd2dc4dfc43b432683b7b3b80355353a&elqaid=1049&elqat=2

¹⁰ World Economic Forum, http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf Page 22-23

- *leverage engagement with the region and movement beyond Australian borders for experience and partnerships with regional neighbours on scholarship programs (Hamer / New Colombo Plan)*^{11 12}

4.3 The need to support life-long learning

Our current institutional structures do not support life-long learning. Long and expensive degrees are becoming less attractive to a modern workforce that regularly switch jobs and careers.

Importantly, in the context of our complex and fast paced digital economy, future demands for talent are changing faster than Industry and educational institutions can keep pace with.

Discussion around STEM has generally focused on how the school and university sectors can help equip young people with the skills and knowledge necessary for the changing economy. With increased expectations for more agile and flexible skill acquisition the role of the vocational education and training (VET) sector is increasingly important. The VET sector already has deep relationships with Industry, expertise and experience in middle skill qualification development and typically provides course offerings that are shorter in duration directed to specific skill requirements.

The Associations recommend:

30. *Government, Industry and academia work together to investigate more agile skill acquisition models aimed to support the re-skilling and up-skilling requirements of the future workforce, including lifelong learning approaches*

4.4 Transitional arrangements for role displacement

While we are optimistic about the outlook for jobs of the future, there is no doubt, that some jobs and people will be impacted more than others. For some, this may involve simple re-skilling or up-skilling. For others, their jobs may change substantially and at worse, disappear. Providing opportunities for workers to re-skill and up-skill is critical to ensuring potentially disrupted workers are not displaced or worse, dislocated from the broader community.

Moreover, consistent with the findings of the Productivity Commission Report on Digital Disruption, the focus for Government should be on assisting displaced workers not on Industry protection or assistance.

Failure to understand the potentially disruptive changes ahead will be a barrier to preparing workforces for the future. ICT and digital leaders can expertly inform the nature, timeframes and impacts of new technologies and with Government and other Industry leaders develop appropriate workforce transition and risk mitigation strategies.

¹¹ <http://www.business.vic.gov.au/support-for-your-business/grants-and-assistance/hamer-scholarships>

¹² <http://dfat.gov.au/people-to-people/new-colombo-plan/scholarship-program/pages/scholarship-program.aspx>

The Associations recommend:

31. *Government and Industry provide opportunities for workers to re-skill and up-skill to ensure potentially disrupted workers are not displaced or dislocated from the broader community.*

4.5 Australia's industrial relations frameworks need to keep up with technology changes to the market

Technology is changing the way we work and for some, the work itself. The extent to which existing laws, regulations and policies are keeping pace with changing technology, work conditions and emerging workplace structures is unclear. A recent example of where this is impacting workers is with Tesla manufacturing in California and industrial relation action taken by workers of the plant.

The roadmaps and frameworks will need to be adapted and rewritten to keep pace with the shifts Industry is undergoing. Australia has a highly skilled workforce and has the capacity to manufacture products and provide services not only to Australians domestically but also internationally within our regional neighbourhood. An industrial relations framework that keeps pace with the technology Industry will be the difference between whether the Industry is conducive to growth or remains an aspect of the economy that is offshored.

The Associations recommend:

32. *Industry to collaborate further with unions to support workers and allow workplaces to better understand technological developments and their potential impacts*