The Digital Economy: Opening up the conversation

This is the plain text version version of our consultation paper. To view the designed version, visit http://industry.gov.au/digitaleconomy.

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Ministerial preface

The Australian Government will develop a new Digital Economy Strategy—a forward-looking plan to maximise the potential of digital technology to improve the nation's productivity and competitiveness, while minimising its negative effects. The strategy will focus on ways governments, businesses and the community can adjust to seize the benefits of digital transformation—including improving access to new and emerging technologies and digital infrastructure to grow Australian industry and jobs.

The digital economy and the technologies that underpin it are fundamental for Australia's success—they create opportunities for our communities and our businesses, drive competitiveness and productivity, and strengthen connectivity across our broad country.

Most of us participate in the digital economy from the moment we wake up in the morning. We check our emails and social media accounts, top up our bus pass online and pay our bills using banking apps while drinking our first coffee of the day.

Digital technologies also allow our businesses to work smarter, save time and access new customers, markets and information. Digitally advanced businesses are more innovative and more likely to be growing revenue and creating jobs.

Australia already has areas of competitive strength, such as energy resources and medical and mining related technologies. We have significant opportunities in emerging sectors like FinTech and precision agriculture. If we move quickly to get in front of our competitors, build on these strengths and become a world leader in digital innovation, McKinsey has predicted we could boost the Australian economy by $140 billion to $250 billion over the next eight years.

Like the previous three industrial revolutions, technological advancement creates challenges for humanity—challenges that cannot be solved by science alone. The shift we are undergoing, as every sector becomes data-driven, is similar in scale to the social and economic shift that took place when the world moved from being agriculture-centric to manufacturing-centric. Australian industries are experiencing increased productivity due to automation, use of sensors, data analytics, and the Internet of Things.

We need to make sure all Australians can take the journey. Our access to broadband has improved but there is still a gap in ability, basic skills, and attitudes to technology, with low income households, people aged over 65, and people with disability more likely to be digitally excluded. For these people, the benefits of being connected can seem out of reach.

We know government doesn't have all the answers. That's why we have committed to developing the strategy in an open and inclusive way. We will be working with experts within and outside of government, and engaging with the community.

This paper marks the start of that conversation and I'm asking for your ideas to help develop the strategy. By planning ahead, we are not only responding to change, but we are seeking to create change—change that is to our benefit.

Senator The Hon Arthur Sinodinos AO
Minister for Industry, Innovation and Science
September 2017

The Digital Economy: Opening up the conversation

Rapid developments in technology and science are changing the way we live, work and do business. These changes come with challenges for our industries, work places and communities. They also present opportunities to increase wellbeing and secure Australian jobs and prosperity.

Digital technologies have immense potential to drive competition, innovation and productivity. There is evidence that business investment in digital technologies results in higher productivity,[1] but Australian businesses are not fast adopters of technology by international standards.[2]

The rest of the world will not wait for us. We need to make the most of digital technologies to develop a diverse and flexible economic base, so that businesses can seize domestic and international opportunities that play to their competitive strengths. Businesses that use and invest in digital technologies tend to be more productive and competitive.[3] We need to look forward at emerging technologies to harness new opportunities for growth.

Digital technologies can also deliver broader benefits by supporting social inclusion and helping us to address big challenges like the changing nature of work, protecting our environment and looking after our ageing population.

Purpose of this paper

This paper is the start of the conversation with all Australians and we're asking for your ideas to help develop the strategy. Your responses will help the government to identify the key issues, challenges and opportunities, and to develop a way forward.

In this paper, we consider the broader digital economy, followed by three broad themes:

- enabling and supporting the digital economy (through digital infrastructure, standards and regulation, and trust, confidence, and security)
- building on our areas of competitive strength to drive productivity and raise digital business capability
- empowering all Australians through digital skills and inclusion.

These themes have been informed by our early conversations with the community on the digital economy.

The strategy

On 19 September 2017, the Australian Government announced it will develop a national Digital Economy Strategy.

The strategy will set out a roadmap for government, the private sector and the community to work together to:

- build on our competitive strengths and develop new ones by:
    - driving productivity within existing industries

[1] Shahiduzzaman, M., Layton, A. and Alam, K. (2015). On the contribution of information and communication technology to productivity growth in Australia. *Economic Change and Restructuring*, 48(3-4), p.300. Abstract available online at https://eprints.usq.edu.au/29017/

[2] Australia ranks in the middle of OECD countries on a range of digital indicators. See OECD (2015), *OECD Digital Economy Outlook 2015*, OECD Publishing, Paris. Available online at: http://www.oecd.org/internet/oecd-digital-economy-outlook-2015-9789264232440-en.htm

[3] Department of Industry, Innovation and Science: Office of the Chief Economist (2016). *Australian Industry Report 2016*. Commonwealth of Australia. Available online at: https://industry.gov.au/industryreport.

    - taking advantage of the changes in our economy
    - opening up new sources of growth to sustain Australia into the future
- develop world-leading digital business capability for globally engaged, innovative, high-growth businesses of all sizes
- drive a culture and mindset that supports lifelong learning, a global outlook, and helps us respond positively to change
- address the 'digital divide' in skills and confidence to help all Australians succeed in a digital economy.

The government will launch the strategy in the first half of 2018, following an open conversation with governments, businesses and the community.

The government already supports action on a diverse range of digital economy initiatives across multiple agencies. A key purpose of the strategy will be to draw together, complement and build on these existing initiatives.

The launch of the strategy in 2018 will set the scene for continuing discussion and debate with the Australian public on our digital future. To make sure we stay up to date, the strategy will continue to evolve over time.

The Digital Economy

The term 'digital economy' describes the range of economic and social activities that are enabled by information and communications technologies. It includes activities like banking, buying and selling, and accessing education or entertainment using the internet and connected devices. The digital economy is not separate to the economy. It impacts all industries and business types, and influences the way we interact with each other every day. It also recognises that as sectors become data driven their economic structures change, industry boundaries blur, and the basis of competition changes.

We need to be ready, as an economy and a community, to respond to change and to grasp the opportunities of the digital economy.

State of play

The past ten years have seen significant economy-wide change. We have seen the ubiquity of smart phones; the rise of global tech companies; and worldwide economic shifts following the global financial crisis. Many say it is the *pace* of change that makes this current wave of digital disruption (the 'fourth industrial revolution') different from those we have faced in the past. It is impossible to predict the future with certainty. But we can expect the shifts of the past ten years to continue as technology continues to accelerate.

Our digital readiness

Australia's performance in the digital economy has been mixed. As consumers, we are embracing technology. In the six months to June 2016, 91 per cent of adult Australians had accessed the internet. Data download volumes increased by 52 per cent between the June 2015 and June 2016 quarters to over 2.2 million terabytes.[4]

We risk slipping behind the rest of the world in digital readiness, especially in growing digital businesses. Australia is now ranked 18th on the World Economic Forum's Network Readiness Index, slipping two places from the previous year. The Network Readiness Index measures the capacity of countries to leverage Information and Communications Technology (ICT) to improve competitiveness and wellbeing. We rank even worse in business use of ICTs, with Australia ranked 24th in the WEF rankings.[5]

Businesses and governments worldwide are moving quickly to build new and advanced digital technology capabilities. Research and development (R&D) expenditure provides insight into what businesses see as important for their future, and the world's largest publicly listed companies are investing heavily in digital R&D. The most recent PwC Global Innovation 1000 Study reported that these companies are shifting their R&D resources away from physical products to software and services and this is paying off financially.[6]

This suggests that businesses worldwide are developing a powerful arsenal of digital technologies. These businesses are increasingly competing in the same global marketplace as Australian businesses, as the digital economy breaks down geographic barriers to market entry.

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[4] ACMA (2016). *Communications report 2015-16*. Commonwealth of Australia. Available online at: https://www.acma.gov.au/theACMA/communications-report-2015-16

[5] World Economic Forum (2016). *The Global Information Technology Report 2016*. Geneva. Available online at: https://www.weforum.org/reports/the-global-information-technology-report-2016

[6] PwC (2016). *2016 Global Innovation 1000 Study: Software as a Catalyst.* Available online at: https://www.strategyand.pwc.com/innovation1000

Despite these market signals, a recent McKinsey report found that the rate of digitisation in Australian industries is uneven, and still a distance from its full potential. Knowledge-intensive industries like financial and professional services lead the pack, while construction and agriculture have low levels of digitisation.[7]

The role for government and the private sector

New and emerging digital technologies are changing the way industries and business work. There are many instances where the market is adjusting well to digital transformation and government intervention is not required. However, in other areas government action might be needed—for example, in connectivity for remote areas and managing security risks.[8] Government and the private sector have a shared responsibility and mutual interest in managing these new challenges.

As well as considering the wider economy, government can set an example by making it simpler, clearer and faster for people and businesses to deal with us, and by better using technology and public data. Government can also drive industry modernisation as a major customer and investor. For example, the Naval Shipbuilding Plan will support innovation and build capability in Australian industry by investing in modern and innovative shipbuilding facilities and processes.

The strategy will link with and reflect, the work already underway to digitally transform government.

Questions

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

   The Australian Computer Society (ACS) Foundation staff have many years experience working in the digital economy as ICT consultants, industry professionals and small business owners.

   One staff member has held multiple contract/gig type employments for 15 years, working across multiple locations in a mobile environment. Mobile technology has opened up 'work anywhere' options including work from home, at the café, at a client site or 'on the road'. This complements the collaborate environment of the corporate office. Digital technologies have also created new client opportunities that were not previously available.

   Another staff member has worked globally for several Australian employers in financial services, mining, higher education, primary health and public health. Over the past two decades, they have increased their usage of digital technology as a critical source of competitive advantage, enabling cashflow advantages and lowering administration costs. Embracing these new technologies enables rapid client response and better service delivery.

   There is a great need for 24/7 national connectivity, for national businesses such as the ACS Foundation, which undertakes a significant proportion of its business activity by digital connectedness. There are implications for data volumes and reliability as that is how our stakeholders interact with us.

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?

[7] McKinsey & Company (2017). *Digital Australia: Seizing the opportunity from the Fourth Industrial Revolution*. Available online at: http://www.mckinsey.com/global-themes/asia-pacific/digital-australia-seizing-opportunity-from-the-fourth-industrial-revolution

[8] Productivity Commission (2016), *Digital Disruption: What do governments need to do?*, Commission Research Paper, Canberra. Available online at https://www.pc.gov.au/research/completed/digital-disruption

Our vision for Australia is one that creates economic equity across the entire nation by expaning digital opportunities in our cities and regions. Regional Australia holds vast natural and agriculture resources that can both power and feed the world while the platform for Australia's next 25 years of economic growth. Sharing access to digital jobs, wealth and connectivity with the regions will allow all Austalians to participate in our national future, not just those who live within 30kms of a state capital. This will maximise our nation's ablity to harness the digital benefits and mitigate the worst effects of future economic downturns.

Key to expanding digital access in the regions is infrastructure. A smart regional digital strategy can alleviate city congestion, the high cost of housing and living, and grow the digital workforce. By building on the NBN, we can grow education infrastructure which produces quality STEM graduates. Digital Education should synchronise its curricula across primary, secondary and tertiary sectors and focus on:

- Creativity and innovation;
- Critical thinking,
- Problem solving and decision making;
- Life-long learning;
- Collaboration and communication;
- ICT literacy;

With the exponential expansion of the IoT (Internet of Things) there will need to be increased security. With those increased demands by both business and households in the IoT future, it will increase connectivity traffic far beyond the current NBN model. Government needs to be thinking that in ten years from now we may well have requirements for eight or ten times the data throughput of 2017. The demands of the SKA alone will challenge the current infrastructure, and the expectations of the "Digital Native Generation" coming through will add to those demands.

The education scope and sequence should encompass the school class room, into TAFE/VET, and then into university. Industry should be involved at all levels to ensure ditigal academia remains integrated with real life work experience and work integrated learning in a digital setting.

In 5 years time, we would like to see digital industry directly showcased in 90% of schools at the primary and secondary level. We would like to see 50% of Australian university technology graduates completing *Work Integrated Learning* as a mandatory part of their degree.

In 10 years time, we would like to see new infrastructure that links Australian regions to the national and international economies. These could be airport initiatives that sees directly flights from regional areas like Toowoomba, Newcastle and Northern Australia, directly into investments and venture capital hubs in Asia. This should be supported by a regional digital education system. Such new links can create growing and vibrant regional communities with quality health and community services which attract population growth in their own right.

In 20 years time, we would like to see transformational nation building infrastructure that establishes new digital cities in our regions with affordable housing connected by innovative and sustainable infrastructure such as a hyperloop/VFT and an expanded clean energy grid.

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

Government must make the digital economic strategy a bi-partisan plan that spans changes and levels of government. Investment in sustainable digital career pathways is essential if all Australians are to participate in the digital economy. Practically, this means supporting serious work integrated learning and internship programs connecting Australian universities and the digital industry.

It is important to promote STEM pathways leading to paid employment in the digital economy, so that parents and students will commit to pursing a digital career. It also means incentivising digital businesses to set up digital jobs in our regional centres.

Government must lead the way by investing in new ways of e-government and encouraging enterprises to invest and develop both people and technologies. This will build business confidence and promote the moonshots of digital trading hubs and world class digital literacy.

All other policies must be fully aligned such as R&D incentives, tax breaks, university access, and business assistance. The key portfolios of health, education and housing must also adopt digital as core strategy. State Employment Agencies like Employment NSW should be encouraging all government departments to expand digital intern and graduate opportunities.

The Government has a leadership role and responsibility to secure the nations digital networks and infrastructure against attackes. Terrorism and State sponsored attacks are already a reality and are likely to only increase. These can bring business to a halt, shut down public infrastructure such as sewerage, water, and electricity, and take over control of things such as WiFi operated traffic lights.

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?

The key disruptive technologies on the horizon are broadly explained as artificial intelligence, data analytics, internet of things, mobility with internet and processing in a low cost way, genomics, clever robotics, renewables, smart energy harvest and storage and cloud systems. Of course there are going to be some major disruption in many business models in the next 10 years and it might be best to categorise them across 7 key sectors;

- **1. Food and Agribusiness or Agtech**; Australia's Food and Agribusiness industry is positioned already with of the best quality in the global markets. We will see demand for Australian food continue to grow a large share of the global marketplace. Smart agriculture together with breakthroughs in water and land use will see this sector outperform most others and continue to require STEM trained employees and farm business owners. Drone and autonomous vehicles will be a change driver in this sector.
- **2. Medical Technologies and Pharmaceuticals or Medtech**; Medtech is another crucial area where our continued push into medical research in areas of genomics, cancer, medical trials, mental illness and primary and secondary care will be truly altered with technology. The moonshot is ultimate healthcare that is accessible for all Australians delivered remotely and in home which will lead to longer and happier lives. Government must continue to drive digital first in these areas of funding and support medically-focused global cooperative research centres – especially with China, USA, EU and ASEAN nations.
- **3. Mining Equipment**: Like agriculture, Australia enjoys a world's best competitive advantage in mining. Over the last 8 years, Australia has survived the commodities price falls through some world first technology and digital adoption. This new digital disruption has delivered world class safety of our workers, lower emmissions and waste and much

greater economies of scale and cost. By reinvesting in mining digital technologies we will protect our world class position and be the preferrd brand and value proposition. Our STEM workers will be in demand to run global corporations from Australian bases.

- **4. Fintech:** Autralia's big four banks disproportionately makes up a large portion of the ASX and jobs in Sydney and Melbourne. Our high house prices and large mortgages also make our banking industry susceptible to small downturns and interest rate changes. Additionally, first home owernship for new families are shrinking which hinders our birth rate and generational succession. New models of peer to peer lending, crowd-sourced mortages, and more non-bank competition could release new first home-owners into the market. However, this should be done in conjuction with affordable housing releases so as to not over-stimulate the housing market. Additionally, a national Blockchain payment strategy will boost national productivity by reducing delays in payents between individuals, small business and enterprise. Secure, instant digital payments will eliminate 'financial jetlag' and increase workforce productivity. It will also introduce a clean and immediately verifiable audit trail.
- **5. Stream-lined regulation:** There is a fixed cost of doing business regardless of size which can be a barrier to our small enterprises. Compliance with local, state and national regulations involves duplication and takes away business time from entrepreneurs and small business owners. Having a consistent and whole of government approach to technology will lead to greater compliance and better use of data for government and increased productivity. The better regulation programme under Minister Dominello must be continued and expanded across all of Australia to minimise complexity between states.
- **6. Regional Efficient and affordable Transportation Links**: First home buyers have been priced out of the Sydney and Melbourne markets, but in the short term, they need to be close to these centres for employment. This has created the undesireable national situation of families who are forced into mega-commutes, involuntarily becoming life-long renters who delay or reject starting a family.

  Unleashing regional Australia's natural advatages of open space through a fast transportation system (VFT) to the regions (such as CLARA or hyperloop) will provide affordable housing in greenfield sites without white-anting capital gains in our urban cities. The CLARA business model is built on regional equity capture release between Sydney and Melbourne resulting in zero budgetary cost to the government. It will result in five digital cities of 400,000 population each between Sydney and Melbourne. The Boring Company Hyperloop model is based on smaller but longer tunnels enabling financially viable underground links through undulating terrain such as Sydney to Newcastle corridor or Sydney to Bathurst corridor.
- **7. New cities:** As new regions are opened up, the digital skills and jobs will also migrate to those regions, giving birth to smart cities. Companies such as Amazon are looking to set up their headquarters in Australian cities that will grow with them. Establishing direct international airport links to Asia from these cities will allow foreign capital to quickly flow into these cities and grow organic digital economies free from the legacy of old designs. These new cities also attract new talent and take pressure off the older infrastructure in parts of major Australian capitals. These smart cities will be built organically sustainable energy production, storage and reuse solutions.
- **8. Growth of SMEs.** There will also be a significant growth of small businesses who depend on the internet to function, and also to be their gateway to the world

- **9. Quantum Computing**. Australia is a world leader in quantum computing which will be another growth factor to be accommodated by 2025.

Enabling and supporting the digital economy

Digital infrastructure

The demand for digital infrastructure for data collection, storage, transmission and analysis is growing. To take part in the digital economy, and to drive innovation and productivity, Australians need access to quality, affordable and reliable communications services, as well as the underlying data, platforms and protocols that support our online activities.

State of play

Connectivity

The Australian Government is providing affordable **high-speed broadband** to all Australian homes and businesses through its $29.5 billion investment in the National Broadband Network. Over six million homes and businesses are already in service areas, with the network on track for completion.[9] The accelerated rollout means that eight million homes and businesses will be connected by 2020.

As at June 2016, 4G mobile networks had expanded to cover up to 98 per cent of the population.[10] Rounds one and two of the government's Mobile Black Spot Program is delivering 765 new mobile base stations to improve mobile coverage across regional and remote Australia. The government's investment in rounds one and two of the program has leveraged a total new investment of almost $600 million, including funding from carriers, state and local governments, and third parties. Included in the government's commitment to the program is $60 million for a priority locations round to target specific priority locations announced by the government.

The government is also improving arrangements for spectrum access by implementing the recommendations of the Spectrum Review, which will ensure mobile broadband services can develop in Australia in line with emerging technology and international standards.

As our appetite for data and connectivity continues to increase, industry is looking to newer technologies like 5G to meet these needs. For example, spectators at the 2018 Commonwealth Games on the Gold Coast will be able to access and experiment with 5G mobile technology for the first time.

Emerging technology: 5G

5G is the fifth generation of mobile phone technology which started with 1G (first generation) in the 1990s. It builds upon the previous generation of mobile technology, promising to deliver dramatically increased speeds and potentially enabling millions more people and devices to be connected to mobile and internet networks. While widespread availability is not expected until after 2020, 5G will open up opportunities for services such as Internet of Things,[11] smart homes and cities and super-fast file sharing while on the move.

The next phase of the internet, where we are always on and always connected, has the potential to transform our economy even further. Horizontal platform technologies like distributed ledger

[9] nbn (2017). *nbn hits six million Ready for Service mark*. Available online at: http://www.nbnco.com.au/corporate-information/media-centre/media-releases/six-million-ready-for-service.html

[10] ACMA (2016). *Communications report 2015-16*. Commonwealth of Australia. Available online at: https://www.acma.gov.au/theACMA/communications-report-2015-16

[11] The 'Internet of Things' is a sensor-driven digital network that enables devices to communicate with each other and collect data. This includes everything from cellphones, coffee makers, washing machines, headphones, lamps, wearable devices and almost anything else you can think of.

technology (for example, blockchain) and machine learning will support innovation and productivity right across the economy.

Australia has opportunities to build capability in some of these key platform technologies – including artificial intelligence, robotics, privacy-preserving analytics and computational law. These technologies can deliver solutions at scale that can be leveraged by Australian industries.

Emerging technology: artificial intelligence

Artificial intelligence, or AI, combines a number of technologies including hardware and software, machine learning, natural language processing and computational power to make machines 'intelligent'. AI has the potential to greatly enhance existing human capabilities and drive productivity improvements across all facets of industry and life. AI will provide opportunities to help reduce repetitive tasks and augment how we work.

Data is a key economic asset. It can stimulate economic growth and innovation and improve the delivery of services, but it is underused. Around 90 per cent of the world's information was generated in just the past two years – but less than five per cent of the potentially useful data is actually analysed and used.[12] Three out of four Australian businesses have stated that data analytics is not important at all to their business.[13] Australian businesses may find themselves at a disadvantage if they are not able to collect and use important data while effectively managing community concern about privacy, confidentiality and transparency.

Data sharing

The Australian Government is investing in **whole-of-government data initiatives** which will open up opportunities for businesses and researchers, while also ensuring data privacy is appropriately addressed. This includes responding to the the Productivity Commission's Inquiry Report into Data Availability and Use; bringing together data assets from across government; and increasing the number and availability of high-value datasets.

For example, the government has taken an important step in promoting innovation by releasing **Australia's Geocoded National Address File**, one of the most requested and high-value digital datasets. Australia is one of only a few countries in the world to make this data openly available. Geocoded address data can be used for many purposes, including personal navigation applications and infrastructure planning.

The government has commissioned an independent review to investigate implementing an **open banking** regime in Australia, with the report due by the end of 2017. Open banking is about giving Australians greater access to their own banking data and has the potential to transform the way in which Australians interact with the banking system.

Questions

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

   Our national infrastructure needs to be designed in a way that is not CBD centric. A good first step is the Greater Sydney Commissions plan of 3 cities. Transport patterns in a digital economy are mobile and diverse. No longer do many jobs require trips from point A to point B and back to point A. Rather they involve point A to B to C to D and back to A. With 5G availability and autonomous driving, more business communication will be done while mobile. The increased use of 5G networks will free up lower frequency bands to be deployed to

[12] Productivity Commission 2017, *Data Availability and Use*, Report No. 82, Canberra. Available online at: http://www.pc.gov.au/inquiries/completed/data-access#report
[13] Australian Bureau of Statistics (ABS) 8129.0 Business use of Information Technology 2015-16, Table 12. Available online at: http://www.abs.gov.au/ausstats/abs@.nsf/mf/8129.0

support IOT in sectors such as transport, manufacturing 4.0 and agriculture. Australia is not ready for the data throughput and security required for IoT. Too much Australian data is held overseas with the implications that it is no longer legally controlled by us. How well is Australia prepared for the volume of data accompanied by IPV6 ?

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

   Making our cities 'digitally smart' will help our nation compete globally. Developing new incubation hubs to cross-pollinate ideas and foster a 'spirit of entrepreneurship' will accelerate the development of new technologies. Integrating transport system such as Opal and Myki technologies with toll tags, petrol station pump payments and parking payment systems will reduce the number of accounts, passwords and tax-time reconciliation required. A single transportation cost report will help with travel compliance and productivity. Further integration of energy production, measurement and consumption will help Australia maximise its energy mix and usage. We need to ensure that there are sufficient charging points for electric cars, not only in the home or around the city but on highways.

Standards and regulation

The advancement of digital technologies – such as cloud computing, the Internet of Things, autonomous systems, trusted data analytics, and the next generation of digital products, services and applications – present major challenges for governments, policy-makers, regulators, standards-setting bodies and industry.

As technology advances, outdated or inconsistent regulation can stifle innovation and drive up costs. New businesses may find themselves operating in a regulatory grey area and new risks may not be anticipated by old legislation. For example, we need to consider the social and ethical implications of our regulations relating to emerging technologies, such as AI and autonomous systems.

As a small, open economy, Australia also needs internationally agreed standards and interoperable systems to support our participation in global supply chains.

Global digital economy engagement

The government **engages internationally** to promote Australian interests and influence international discussions on digital economy policy with organisations such as the OECD and the G20. We work with three key OECD committees to further our economic, entrepreneurial, innovation and digital policy platforms, and to gain policy insights through OECD research and feedback from other countries.

Australia also places a high priority on the G20 as the premier forum for global economic cooperation. The 2017 G20 summit under Germany's Presidency included a digital economy work stream. The 2018 G20 Presidency will be held by Argentina and will continue to progress digital policy agendas, including digital inclusion.

State of play

Regulatory reform

Digital transformation is changing our markets, and taking place faster than the renewal of existing legal frameworks. Digital platforms can resolve information asymmetries by arming consumers and small businesses with information previously only available to large companies. They can solve other competition problems, by lowering barriers to entry to markets.

However, new technologies can present new risks to the community around privacy, security and ethical concerns – including the implications of autonomous systems making decisions for us, or around us (for example, autonomous vehicles). Digital transformation can also lead to new forms of market power and barriers to entry through control over data, networks and platforms.

Traditional industries are being disrupted and the distinctions between industry sectors are becoming blurred as tech firms move into new areas like banking, retail and healthcare. Our traditional regulatory approaches, which take a sectoral approach, may no longer be appropriate.

These changes are already impacting on our regulatory system. For example, government has acted to level the playing field for small Australian businesses by extending the GST to low value imported goods that are purchased online and cracking down on multinational tax avoidance.

Technology can also be used simplify business and automate aspects of compliance.

Better digital government services

Australians want access to government online. Research shows most people are comfortable with using digital channels to interact with federal government agencies, and more than a third have said it was most preferred, or one of their preferred, channels. This was even higher for small businesses, at 45 per cent.[14]

That is why the government has established the **Digital Transformation Agency**[15] to drive digital transformation of government services.

The role of the Digital Transformation Agency is to build capability across the Australian Public Service in digital delivery and central oversight of the government's ICT agenda. The government has three clear digital transformation objectives:

- continued migration of government services to digital channels
- significantly improved experiences for individuals and businesses
- improved outcomes from taxpayer's money spent on ICT.

Federal, state and territory governments are working together under the **National Business Simplification Initiative**[16] (NBSI) to make it easier for business to get things done with government. By delivering better digital services and streamlined regulation, the NBSI will deliver real savings to business so they can focus on growing their business, creating more jobs, developing new products, and exploring new market opportunities.

A joint NBSI initiative with the NSW government links the Business Registration Service with the Service NSW system to make it faster and easier to start a café or restaurant in five council areas. In the future, the initiative will be extended to other locations and sectors.

Standards

Effective standards are vital for success in a digital world. For example, smart cities, advanced manufacturing, digital health care, and FinTech all rely on an unprecedented degree of system integration and interoperability. Given the global nature of technology, internationally harmonised standards can help businesses boost efficiency, increase productivity and maximise opportunities for growth by ensuring interoperability of technology across jurisdictions.

[14] Digital Transformation Agency research. Available online at: https://www.dta.gov.au/blog/how-do-australians-really-feel-about-digital-government-services/
[15] http://www.dta.gov.au/
[16] http://www.industry.gov.au/smallbusiness/Pages/National-Business-Simplification-Initiative.aspx

In a World Economic Forum study, 47 per cent of respondents indicated that establishing and promoting common standards is an important action that governments can take to accelerate the adoption of the Industrial Internet of Things.[17]

Developing international standards

On behalf of the Australian Government, Standards Australia is leading the Reference Architectures, Standards and Norms working group as part of **Prime Minister's Industry 4.0 Taskforce**.[18] Industry 4.0 has been called the fourth industrial revolution. Successful adoption of Industry 4.0 standards is critical for Australian manufacturing to remain globally competitive.

The Taskforce has now signed an agreement with Germany's *Plattform Industrie 4.0* to cooperate across five work streams, representing key challenges in the transition to Industry 4.0. These include reference architectures, standards and norms; support for small and medium businesses; *industrie 4.0* testbeds; security of networked systems; and work, education and training.

The work of the Taskforce and Standards Australia ensures Australia is involved in and aware of potentially disruptive changes taking place globally. It also ensures Australia is able to provide expert advice and representation in relevant international standards development processes.

Emerging technology: Blockchain

Distributed ledger technology (e.g. blockchain) has the potential to disrupt and revolutionise financial transactions and services. It can be applied wherever a verified and trusted transaction is required – health, government services, real estate, media, energy and more. Blockchain allows parties to transact without the need for a centralised intermediary (like a bank) to verify the transaction. The Treasury and CSIRO's Data61 have undertaken a **review** to examine distributed ledger technology's general potential and its implications for government and industry.[19] Australia is also leading the development of blockchain standards.

Questions

7. What opportunities do we have in standards development and regulation to:
   - enable digital entrepreneurship, innovation and trade?

     Digital Skills are the new global language. We need to ensure all Australians are learning the digital concepts and applications to be literate in our future society. Coding in schools and a national emphasis on STEM pathways through primary, secondary and tertiary education is critical for the sustained performance of our digital economy.

     To enable entrepreneurship and innovation, start early. Primary schools must introduce coding. Cognitive and dexterity skills can be developed through activities like Minecraft, building robots, drone pilot training, and gamification. Celebrate entrepreneurship by creating more events that recognise children as young entrepreneurs.

     To power trade, encourage international university partnerships and exchanges with key hubs in Taiwan, Silicon Valley, Singapore and China where they understand the components of R&D, testing, production, logistics and marketing on a global scale.

   - mitigate the risks associated with digital disruption? The digital economy is quickly becoming the whole economy across every industry. As such when Australian students learn STEM skills, they are gaining skills that can be applied in nearly every industry and

[17] World Economic Forum (2015). *Industrial Internet of Things: Unleashing the Potential of Connected Products and Services*. Available online at: http://www3.weforum.org/docs/WEFUSA_IndustrialInternet_Report2015.pdf.
[18] https://industry.gov.au/industry/Industry-4-0/Pages/PMs-Industry-4-0-Taskforce.aspx
[19] http://www.data61.csiro.au/en/Our-Work/Safety-and-security/Secure-Systems-and-Platforms/Blockchain

makes them less susceptible to unemployment downturns that may more adversely affect a single industry

- how is the Government planning to regulate tax payment and money transfers in a truly cyber based economy using digital money such as bitcoin ?

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?

Legal precedents rather than technological possibilities will be what delays the implementation of new innovations. Ethical digital behaviour needs to be instilled and consistently enforced. Clear drone standards, email and mobile phone spam standards and data storage standards need to be communicated to the Australian population so that public confidence in adoption will not be derailed by inevitable high profile breaches. Just as Australia's timely national gun buyback system prevented devastation, so pro-active national digital standards will reap rewards if implemented before the genie escapes the bottle.

Trust systems must be established very similar to the rules of internatonal law. This will require governments to agree on industry harmonisation and standards for information sharing, certification, data protection, censorship, and risk and control systems.

Trust, confidence and security

Online engagement comes with risks associated with national security, cybercrime, data breaches and other types of malicious online activity. At an individual level, some citizens are particularly vulnerable to online threats, technology-facilitated violence and scams.

Our ability to make the most of digital technologies depends on the extent to which Australians can safely and confidently interact online. At the core of this is trust in the companies, services, people and data we transact or communicate with. Community education and digital literacy is key.

State of play

The cyber security environment is constantly evolving. We need to be adaptive and proactive to face the cyber security challenges on the horizon.

Cyber threats

Awareness and readiness of cyber threats is improving in Australia. While Australian companies are being hit with more malicious cyber activity, they are also putting in place better defences. In 2016, 59 per cent of organisations in Australia detected a business-interrupting security breach on at least a monthly basis, which is more than twice as often as 2015.[20] Reports of ransomware activity reported to the Australian Cybercrime Online Reporting Network roughly doubled in 2016 compared to 2015.[21] However, 71 per cent of respondents to the Australian Cyber Security Centre

[20] Telstra Corporation Limited (2017). *Telstra Cyber Security Report 2017*. Available online at: https://www.telstraglobal.com/au/insights/whitepapers/whitepaper/telstra-cyber-security-report-2017

[21] Australia's Cyber Security Strategy – First Annual Update. Available online at: https://cybersecuritystrategy.pmc.gov.au/first-annual-update/index.html

Cyber Security Survey reported having a cyber security incident response plan in place, compared to 60 per cent in 2015.[22]

Cyber security

The Australian Government has identified cyber security as a key element for national prosperity and security. The **Cyber Security Strategy**[23] aims to secure Australia's prosperity in a connected world, with a focus on: a national cyber partnership; strong cyber defences; global responsibility and influence; growth and innovation; and a cyber smart nation.

Scams and privacy risks

As Australians spend more time online, they can be susceptible to online scams and cyber-crime. In 2016, the ACCC received reports of $48.4 million in losses from online scams, with an increase in the number of social media scams reported.[24]

Australians are increasingly concerned about the privacy risks that have evolved in tandem with new technology and increasing exposure to cyber security threats.

A recent survey found that 69 per cent of Australians are more concerned about their online privacy than they were five years ago.[25] However, when it comes to protecting our personal information, the majority of Australians do not use the security and privacy settings available to them. More than three-in-five Australians do not regularly read online privacy policies or adjust their privacy settings on social media sites.[26]

Australia's cyber security industry

The global cyber security market is expected to grow from about AU$100 billion in 2015, to more than AU$200 billion by 2020.[27] This presents Australian businesses with the opportunity to tap into a growing industry for cyber security products and services. Cyber security in Australia is a small but fast-growing industry, employing approximately 19,000 people,[28] either as part of an organisation's internal cyber security workforce or through external cyber security providers.

Having a stronger cyber security industry will enhance Australia's global reputation as a trusted and secure business environment. There will be significant spillover benefits to the wider economy. Deloitte has predicted that a greater focus on cyber security by Australian businesses could lead to a lift of 5.5 per cent in business investment by 2030, and an extra 60,000 people employed.[29]

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[22] Australian Cyber Security Centre (2017). *2016 Cyber Security Survey*. Commonwealth of Australia. Available online at: https://www.acsc.gov.au/publications/ACSC_Cyber_Security_Survey_2016.pdf

[23] https://cybersecuritystrategy.pmc.gov.au/

[24] Australian Competition & Consumer Commission (2017). *Targeting scams: Report of the ACCC on scams activity 2016*. [online] Commonwealth of Australia. Available at: https://www.accc.gov.au/publications/targeting-scams-report-on-scam-activity/targeting-scams-report-of-the-accc-on-scam-activity-2016.

[25] Office of the Australian Information Commissioner, 2017 Community Attitudes to Privacy Survey 2017. https://www.oaic.gov.au/engage-with-us/community-attitudes/australian-community-attitudes-to-privacy-survey-2017

[26] Ibid.

[27] Gartner as reported by Forbes: http://www.forbes.com/sites/stevemorgan/2016/03/09/worldwide-cybersecurity-spending-increasing-to-170-billion-by-2020/#d1423c676f80

[28] Australian Cyber Security Growth Network (2017) Australian Cyber Security Competitiveness plan: The potential of Australia's Cyber Security Industry. https://www.acsgn.com/cyber-security-sector-competitiveness-plan/potential-australias-cyber-security-industry/

[29] Deloitte Access Economics for Australian Computer Society (2017). *Australia's Digital Pulse*. Deloitte Touche Tohmatsu. Available online at: https://www2.deloitte.com/au/en/pages/economics/articles/australias-digital-pulse.html

Boosting Australia's cyber security industry

Through the National Innovation and Science Agenda, the government committed $30.5 million to establish the Australian Cyber Security Growth Network (ACSGN).[30] The ACSGN is an independent, not-for-profit company, driven by eminent industry leaders. The network has developed a Sector Competitiveness Plan, informed by interviews with the private sector, policymakers and researchers, designed to help Australia become a global leader in cyber security solutions.

Questions

9. What opportunities do we have to build trust and community confidence through resilience to cyber threats, online safety and privacy? Cyber bullying is an evolving social problem and a mental health priority. Training our children to manage technology is vital. Building extra-digital relationships such as *'Generation Connect'* between retirement homes and schools can strengthen resilience and social appreciation as a counter-weight to technology addiction. It is vital to empower future generations to be digital masters rather than slaves.

   We need to enhance levels of encryption and user education to ensure users are alert but not alarmed by hacks and attacks on personal information. Cyber Police capability should be enhanced as more wealth is stored and transacted digitally. Government capability to investigate, freeze and track criminal behaviour across borders should also be enhanced.

   Common State and Federal governments legislation and sharing of data would be an obvious starting point.

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

    There are many areas where the government in consultation with community must be heavily involved in protection for a digital economy. These areas include protection of digital consumers – whether they be renewing their drivers license, dealing with a medical interface or investing in their superannuation.

    Life skills are not 'soft'skills' and there must be an enduring focus on programmes that teach a balanced digital diet. Digital usage in moderation is absolutely essential for a healthy national pschycology. Self discilpline in the time spent online and the ability to implement a personal 'digital detox' to avoid any addiction and associated physical and mental health risks.

    Digital gaming platforms will play a big role in our digital future as they engage gamers if they combine a sense of fun distraction with healthy movement, goal setting, achievement of mission and social connections. In moderation, gaming can help deal mental illness such as reducing depression. Gamification skills will increase in the workplace particularly in simulation and design jobs.

    Similar to the anti smoking campaigns, the Government needs to undertake a public awareness campaign on digital scams to protect the public.

11. What integrity and privacy measures do we need to ensure consumers can protect their data? The principle of the individual owning their personal data and being able to download and delete it is a key to managing the safety and integrity of individuals and citizen rights. It should

[30] http://www.acsgn.com

be a citizen's right to encrypt their own data, and an offense not to disclose when your data has been compromised on a businesses system, such as Uber.

12. What are barriers for business, particularly small business, in adopting cyber security and privacy practices?

A digital joke is "There is no such thing as the cloud: It is just someone elses' computer". Small business owners who use new technologies are often not aware of where their data is stored. This creates soverign risk and often occurs through ignorance. A breach can have devastating result when business and customer's data is compromised. There is also a danger that your data can be held in another country's legal system, and you might have almost no rights in some instances.

13. What integrity measures do the Australian Government and the private sector need to take to ensure business-consumer transactions are secure?

It is essential that the Australian government work with industry to develop world class audit and certification standards around e-commerce including websites, trading platforms, exchange, title, payment and settlement systems and management of data. Additionally, the government can promote and/or provide an "Australian Hosted" cloud solution tailored towards small business. Imitating the programmes like the "Australian Made" and "Buy Australian" campaign, these tools and government backed initiatives can help stimulate our national economy, manage the risks while giving a leg up to local providers.

Legislation like Sabarnes Oxley could also be introduced in the space of digital to ensure Australia has the community confidence through site certification for all consumers buying from an ABN provider online.

Building on our areas of competitive strength

Adoption and use of digital technologies can be a significant driver of economic growth. Digitally mature businesses tend to be more productive and competitive than those that are less digitally mature. This capability can be a significant source of growth at a time when we need productivity growth to improve.[31]

State of play

Australia has strengths in areas like our stable financial and legal frameworks and institutions; quality infrastructure; and our skilled workforce. We have the abilities, talent and ideas to tap into emerging digital industries like cyber security. Many of our existing competitive industries like resources, manufacturing and the financial and insurance services sector are using technology to drive growth. Digital technologies are now generating productivity benefits across Australian industries. These technologies include the use of new sensors, big data analytics, cloud computing and the Internet of Things.[32]

Australian businesses are not fast adopters of technology by international standards. Australia ranks in the middle of the OECD economies on a range of digital engagement indicators.[33] If adoption of technologies does not improve, we put ourselves at risk of falling further behind.

At an individual business level, many Australian businesses are lagging in the sophisticated use of digital technologies. Most businesses have internet access (95.3 per cent), about half have a website (50.1 per cent), and relatively few have a social media presence (38.2 per cent).[34]

The National Innovation and Science Agenda

The government launched the **National Innovation and Science Agenda** (NISA) in December 2015.[35] This is a $1.1 billion investment in a package of measures, which provide a strong foundation for innovation-led growth. The NISA package includes funding the development of a silicon quantum integrated circuit – the first step in developing a practical quantum computing system, and several initiatives to better equip young Australians to create and use digital technology. NISA also includes support for Data61, the country's leading data science innovation network. Over 80 per cent of the NISA initiatives have already been implemented and we will continue to do more. Our approach will be informed by Innovation and Science Australia's 2030 Strategic Plan.

The **Industry Growth Centres Initiative** [36] is helping Australian firms to be more internationally competitive by enabling key sectors to build capability through a collaborative, industry-led approach. These sectors are Advanced Manufacturing; Cyber Security; Food and Agribusiness; Medical Technologies and Pharmaceuticals; Mining Equipment, Technology and Services; and Oil, Gas and Energy Resources.

[31] Department of Industry, Innovation and Science: Office of the Chief Economist (2016). *Australian Industry Report 2016*. Commonwealth of Australia. Available online at: https://industry.gov.au/industryreport.
[32] OECD (2017). *Key issues for digital transformation in the G20*. Available online at: https://www.oecd.org/g20/key-issues-for-digital-transformation-in-the-g20.pdf
[33] For example, Australia ranks 12th for business IT investment as a proportion of total capital investment. See OECD (2015), *OECD Digital Economy Outlook 2015*, OECD Publishing, Paris. Available online at: http://www.oecd.org/internet/oecd-digital-economy-outlook-2015-9789264232440-en.htm
[34] Australian Bureau of Statistics (ABS) 8129.0 Business use of Information Technology 2015-16, Table 1 (cat no. 8129.0). Available online at: http://www.abs.gov.au/ausstats/abs@.nsf/mf/8129.0
[35] https://www.innovation.gov.au/page/agenda
[36] https://industry.gov.au/industry/Industry-Growth-Centres/Pages/default.aspx

The growth centres, particularly the Cyber Security Growth Centre, are setting digital skills and capability as a focus of firms in their sectors and are identifying challenges and opportunities from rapid advancements in digital technologies.

Going digital isn't just for big business and start-ups. Small and medium businesses are an essential driver of the Australian economy. The 2.1 million small businesses in Australia represent 97 per cent of businesses, employ more than 40 per cent of Australia's workforce and contribute 33 per cent of Australia's GDP.[37] But many small businesses are not realising the full potential of digital technologies. Research from the Commonwealth Bank suggests that 80 per cent of small and medium businesses are delaying the adoption of technology that could offer long-term benefits.[38]

Digital technologies offer opportunities for small and medium businesses to work smarter and more efficiently, and to access new customers, markets and information. But smaller businesses tend to lag their larger counterparts in adopting digital technologies.

Using computer games in new ways

The potential gains from encouraging innovative games and interactive content development are significant. For example, research undertaken by Neuroscience Research Australia included a games-based stepping exercise to assist sufferers of multiple-sclerosis to develop their balance and mental skills, and Mines Rescue offers virtual reality training that is revolutionising the way miners are taught about safety.

A further example is the award winning interactive online game, The Voyage Game. Developed jointly by the Australian National Maritime Museum, Roar Film, Screen Australia, Screen Tasmania and the University of Tasmania, The Voyage Game teaches students in Australia and overseas about Tasmania's convict history.

Developing domestic digital capabilities will support and enable Australian businesses and consumers to participate in global digital trade.

Global e-commerce sales continue to grow rapidly and e-commerce is projected to grow from approximately 10 per cent of total retail to greater than 40 per cent in 2026.[39] While a significant proportion of e-commerce is still conducted domestically, the nature of digital trade means that Australian businesses of all sizes can readily target markets around the world. This potential extends even to small businesses which would not previously have had the capacity to develop overseas markets. Australian business can leverage worldwide reputational advantages for Australia as a producer of safe, high quality products across a range of sectors.

Digital trade is not just about buying and selling goods and services online. It includes the transmission of information and data across borders.

There is significant potential for growth in digital trade in the Asia-Pacific region as internet usage increases, providing Australian businesses opportunities for increased export of digital goods and services to the region.

[37] Australian Small Business and Family Enterprise Ombudsman (2016). Small Business Counts. Commonwealth of Australia. Available online at: http://www.asbfeo.gov.au/small-business-counts

[38] Commbank.com.au. (2016). *Small business postpone digital adoption*. Available online at: https://www.commbank.com.au/guidance/newsroom/small-businesses-research-tech-201609.html.

[39] World Economic Forum (2017) Shaping the Future of Retail for Consumer Industries' Insight Report. Available online at: http://www3.weforum.org/docs/IP/2016/CO/WEF_AM17_FutureofRetailInsightReport.pdf

Digital Trade

Australia is pursuing rules in trade negotiations to create a consistent, predictable and stable environment for business. For example, the government looks to achieve rules through its free trade agreements to provide businesses flexibility in the way they send data across borders, and where they can store their data. The government also pursues rules to facilitate paperless trade and electronic transactions in addition to rules on privacy and cooperation on cyber security.

International fora such as APEC and the G20 also provide opportunity to cooperate and share best practices on digital trade with major trading partners.

Through Australia's Aid for Trade investments, the government helps build the capacity of developing country partners to implement regulations and standards that facilitate global trade. Through these investments, the government also encourages developing countries' uptake of technologies that make trade more efficient. Australian firms have notable technologies and expertise to offer in this field.

Further information on the government's digital trade initiatives including opportunities for public input can be found at http://www.dfat.gov.au/.

Emerging technology: quantum computing

Quantum computers can solve bigger problems faster through the power of quantum physics. A classical computer can check many different possibilities in rapid succession but a quantum computer can check many different possibilities in parallel, reducing computing time significantly. Quantum computing has the potential to transform the way Australian and global firms do business – from banks undertaking financial analysis, to transport companies planning optimal logistic routes, to healthcare companies designing and delivering new personalised medicines.

Australia is well placed to be a world leader in quantum computing. There are significant activities underway right now to grow and build a quantum ecosystem here, which will create new growth and job opportunities.

Questions

14. What is holding Australian businesses back in terms of benefiting from digital technologies?

The current high costs of living drive high wages which are holding Australia back in terms or attracting and retaining global STEM talent. Because the market demands high wage jobs, it is endangering the future viability of entry level jobs. There is also the high cost of telecommunications in Australia along with slow speeds. Thought should be given to removing the need for NBN to make a profit.

Without any entry level digital roles in our workforce, the future of the broader digital industry faces medium to long term risks leading to decline. While governments have previously funded digital career development programs, by in large, these programs have been poorly implemented with few employment outcomes of note. For example, Australia's recent experience with VET Fee-HELP led to RTO rorts which in some cases cost taxpayers $1,000,000 for each diploma graduate.

For these reasons we highlight the proven approach through the ACS Foundation of matching exact industry and government workforce requirements with their large and growing database of digitally focused school children and university students.

The ACS Foundation currently has identified thousands of students (both domestic and overseas fee paying) that cannot enter the Australian workforce. Often reasons are cited as due to literacy, communication, work readiness, or visa restrictions. Australia has a difficult Industrial relations model that puts too much risk on hiring staff for a SME.

We need to radically invest in internship models like the ACS Foundation's *Work Integrated Learning (WIL)* program that provides digital students placements for industry. This simple model creates the necessary work experience that the soon to be job seeker needs start their future digital career. The model can also manage all the student placement logistics freeing up technology departments and digital businesses to focus on hosting the student.

The government sector itself must consider participating in such a digital workforce development plan. All levels of government could come togeterh to invest in a digital internship program as a complimentary pre-cursor to their graduate programs. In the past 5 years, the ACS Foundation has identified and inspired over 26,000 school children through their *Big Day In* events. These students are part of the coming wave of Australia's future digital workforce.

More government bodies should consider sponsoring students through ACS Foundation programs. Sponsoring these programs is a tangible way to support the future of Australia's ICT industry while strategically build a work-ready graduate pipeline.

15. What would help Australian businesses to embrace digital technologies?

Confidence that Australia is developing a long term, sustainable pipeline of STEM skills will assist businesses to make investment decisions such as where to base their headquarters or open up new markets.

Technology will shift jobs and it is critical that many people affected by loss of are proactively re-trained into new areas of growth. Learning and adaptive skills are critical and so this must be a key part of every job as the nature of work changes

Cheaper telecommunications.

16. What efforts are you or your organisation making to respond to digital transformation? Why?

The ACS Foundation is working with schools and all Australian universities to create digital career pathways for students. ACS Foundation Programs include school student IT conferences, scholarships, internships and entry level job programs. The ACS Foundation aims to expand its reach by facilitating jobs of tomorrow for Australian students, building a smart workforce for industry, and contributing to national GDP.

The ACS Foundation's *Big Day In* program hosts primary (years 4-6) and secondary (years 9-12) school ICT conferences across Australia. Supported by over 100 industry partners and employers like Apple, Atlassian, Google, IBM, Adobe, Animal Logic, Wisetech, Microsoft, CSIRO, and many more in the technology industry including start-ups. Hundreds of schools have the *Big Day In* on their school calendar as annual digital career excursion. These conferences are hosted every year at 10 different Australian universities. At these events, students engage with industry partners and often arrange a week's work experience to fulfil their year 10 and 11 work experience requirements. Since 2012, the *Big Day In* has reached 26,180 school students at both the primary and secondary school level.

The ACS Foundation's university programs have provided over 6,500 university students scholarships since 2001 at a value of over $70 million. This now equates to 10% of Australian

ICT students receiving an ACS Foundation WIL scholarship as part of their degree program. With 70%+ of students receiving a permanent employment offer with their industry host, post-scholarship, this program is instrumental in building Australia's digital workforce pipeline. The ACS Foundation would like government support to double this program's reach to 20% of the Australian ICT university pipeline by 2020.

17. What opportunities do we have to use digital technologies to improve linkages into export markets and global supply chains?

    There are so many opportunities across the export sectors to improve Australia's wealth and ability to compete. We see blockchain technologies as being a key enabler that will reduce some of the intermediation fees and high costs for small business. Also, we must keep developing traditional means of connecting and a key one will be more direct flights from regional and rural settings into Asia, especially from secondary airports such as Newcastle, Tamworth and Toowoomba.

    We should develop efficient air routes where our universities are located to also stimulate further the choices for overseas students as whilst our major city universities are at capacity, our regional universities are under utilised, for example UNE. Interational Education is already our 3rd most valuable export and growing given our unique proximity to the Asian nations, especially China, India, Vietnam, Thailand, Indonesia and many others.

    Such a strategy immediately means business and consumers can easily move between markets, study, tour, hire on short term assignments and collaborate. Such investments will lead to stronger cultural understanding, grow trust and improve export markets.

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?

    Harnessing the 'gig economy' and talents in a fair and equitable way for workers is essential to protect the fabric of our society while offering small business owners the flexibility to engage digital skills locally.

    A standard gig economy framework for 'gig platforms' that covers a sufficient living wage and benefits (education, health and accommodation) while offering competitive engagement costs should be a government initiative.

    There is a huge opportunity for SMEs to gain customer insights by using data that is captured in finance, banking and retail systems. Such insights can be gained through smart adoption of AI and machine learning once they start to structure their data. The larger banks are starting to provide some of these insights to their customers unlocking patterns in consumer spending when variables like weather, day and time are considered. This in turn helps SMEs better predict buying patterns and timing for stock.

    We would encourage the government to develop more intern roles in this analytics space and using public data lakes that are accessible on the cloud allow this to grow as a SME targeted service. We would also like to see other government agencies develop more digital and data resources that could be accessed as a free or low cost service to SMEs to encourage digital employement.

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?

    We should be leaders in some of our traditional industries where we are the leader or challenger – these include and are not limited to;

    1. Food and Agribusiness AND Agtech;
    2. Medical Technologies and Pharmaceuticals;
    3. Mining Sector:
    4. Fintech:
    5. Stream-lined regulation:
    6. Regional Efficient and low cost Transportation Links:
    7. Manufacturing 4.0;
    8. Higher Education:
    9. Tourism:
    10. Shipping Security:
    11. Quantum Computing.

Empowering all Australians through digital skills and inclusion

As digital technology changes the way we live, it impacts our society through disruption to workforces and industries, and our social relationships and cultural practices. There are good opportunities to use technology to improve access and outcomes in education, health and social inclusion. But those who could most benefit are at risk of being left behind.

State of play

We are relying on the internet more and more for our everyday activities. In June 2016, 94 per cent of adults used the internet to conduct banking, pay bills, or buy and/or sell goods and services.[40]

Despite this a digital divide still exists. The 2017 *Australian Digital Inclusion Index* found those with low levels of income, education and employment are significantly less digitally included. While the gap in access to broadband has narrowed in recent years, there are still gaps in digital ability, basic skills, and attitudes to technology.[41]

There is also more to be done to promote the inclusion of women in STEM areas related to digital production and infrastructure, and women as entrepreneurs in the digital economy.

Improving digital literacy

The government is working to improve digital literacy. The **National Innovation and Science Agenda** contains several initiatives to equip young Australians to create and use digital technologies, and inspire STEM literacy in early education. We are expanding opportunities for women in STEM by investing $13 million over five years to encourage more women to choose and stay in STEM research, related careers, startups and entrepreneurial firms.

We are also working to raise the digital skills of older Australians. **Be Connected**[42] is an initiative aimed at increasing the confidence, skills and online safety of older Australians. From early October 2017, Be Connected will deliver a range of resources specifically for those aged 50 years and over, who have minimal or no engagement with digital technology.

The way we work is changing with more part time work and the rise in the 'gig' economy. Structural changes in our economy, including digital disruption, are changing the skills that employers need. This requires workers to be adaptable enough to adjust to the changing nature of work and undertake life-long learning, including the use of micro-credentialing.

People will need a combination of technical skills – a trade, university degree or on the job training – and entrepreneurial skills like communication, critical thinking and digital literacy. Management skills are vital for digital businesses to achieve global scale, and capture market value. We also need the right culture and mindset to embrace innovation and lifelong learning.

Technology change also has wider cultural implications and offers opportunities for all Australians. Our cultural institutions for example, are taking advantage of improved connectivity to educate, entertain and improve awareness of Australia's heritage and cultural treasures. It is recognised that technology and humanity shape each other.[43] The creation and use of technology can lead to

[40] ACMA (2016). *Communications report 2015-16*. Commonwealth of Australia. Available online at: https://www.acma.gov.au/theACMA/communications-report-2015-16
[41] Thomas, J, Barraket, J, Wilson, C, Ewing, S, MacDonald, T, Tucker, J & Rennie, E, 2017, *Measuring Australia's Digital Divide: The Australian Digital Inclusion Index 2017*, RMIT University, Melbourne, for Telstra. Available online at www.digitalinclusionindex.org.au
[42] https://www.dss.gov.au/seniors/be-connected-improving-digital-literacy-for-older-australians
[43] Robert C. Williamson, Michelle Nic Raghnaill, Kirsty Douglas and Dana Sanchez, Technology and Australia's future: New technologies and their role in Australia's security, cultural, democratic, social and economic systems, Australian Council of Learned Academies, September 2015. Available online at: http://users.cecs.anu.edu.au/~williams/TAAF.pdf

social change – for example, the rise of social media has been linked to changes in the way people interact with each other. Many decisions and recommendations are now made in an automated way using internationally developed algorithms, based on retrospective data. We need to develop a deeper understanding for how we retain the cultural and ethical values that are important to us, while also benefiting from these new global systems.

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?

    Many of our schools and training institutions are stuck in the past, focused more on complying with complex regulations and training packages than preparing students for an innovative and evolving workplace. Teachers and trainers often have limited exposure to industry and current digital trends. As such, they are not well equipped to represent the digital industry. Therefore, students are not inspired to select the digital subjects in the required numbers to meet workforce demand and create a sustainable pipeline for the jobs of the future.

    This situation further underlines the immediate need to expand programs like the *Big Day In* to support students directly, empower teachers with current STEM information and provide the connection point for education with the digital industry. The ACS Foundation would like government support to triple the annual *Big Day In* reach to 20,000 school students annually in 2019. The following quotes from recent *Big Day In* events demonstrate the impact that occurring.

    > *Thanks again for your part in the Big Day In at RMIT, it was a brilliant look in for the students at where they can go with ICT!* **- Rhys Gannell, e-Learning Teacher and VLE Support, Westbourne Grammar School**
    >
    > *Congratulations on your contribution to an exciting learning experience today at the Junior Big Day In. My daughter could not stop talking about the day to school friends and family members. The three-part workshop was a great way to keep the students engaged and experiencing the different roles in the creative/design process* – **Peter, Parent**
    >
    > *The students left with insight into the indispensable significance of the computing industry on our society and economy as well as a strong sense that they too can contribute to the creation of our collective futures. The Big Day In also provided a window into the fast paced world of ever changing technology, a world that our students are excited about and ready to embrace. This tremendously valuable experience is highly recommended to all teachers in assisting them to better understand and cater to the digital natives under their guidance.* - **Peter Davis, Head Teacher Technological & Applied Studies, Normanhurst Boys High School**
    >
    > *I just wanted to thank you for organising such a fantastic event and helping me with my friend's ticket, we had a great time! (*he had such a great time, he came to the UTS event & then came to Newcastle event) - **Tom O'Meehan, student, Gosford High School**

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?

    Opening up STEM in schools to Baby Boomers will help older generations re-skill and also facilitate intergenerations community relationships. Removing age as a barrier will encourage a learning environment which is open and enjoyable for all generations. This will allow the

retired sector to participate in the digital economy through community colleges and library resources.

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

Technology is both a tool and a means for change. It can be used for good or for evil. Australia should ensure that our digital strategy considers the individual, real relationships and workforce best practice for the long term health of our economy and community.

Technology has increased the pace of sharing information and communication. Australians now expect to communicate with each other and externally with customers, family and government both rapidly and instantly. A few beneficial aspects of technology in our cultures are:

1. Having access immediately to information that impacts us can aid responsiveness to change. This is very efficient and effective in time critical ssituations.
2. For SMEs the operational cost can be reduced (allowing higher profit margins) by having employees work from different geographical places
3. Enhance and speed up the core work function
4. Generating greater masses of information and data about us, environment and customers.

Your views

Australia already has significant areas of strength. We need to build on these strengths and make the most of our opportunities for Australia to fulfil its potential. That's why it's important that we have a robust conversation now to work out how we can best build on what we've done and make the most of the opportunities presented by the digital economy.

How to have a say

We've made it easy to get involved.

To share your views, for more information, or to sign up for strategy updates, visit http://industry.gov.au/digitaleconomy.

You can share your views on some, or all, of the topics and questions – it's entirely up to you.

You can also get in touch with us by emailing digitaleconomy@industry.gov.au.

Alternatively, you can contact us by mail at:

Digital Economy Strategy team
Department of Industry, Innovation and Science
GPO Box 2013
Canberra ACT 2601

You have until 30 November 2017 to engage with the discussion paper and submit your ideas. Get in early to be part of the conversation.