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Dear Sir or Madam,

PRODUCTIVITY COMMISSION RESEARCH STUDY - DISRUPTIVE TECHNOLOGIES

The Australian Industry Group (Ai Group) welcomes the opportunity to provide input to the Productivity Commission's research study "Disruptive Technologies: What do governments need to do?".

Ai Group understands that the objectives of this study are to: examine the potential impacts and challenges of innovative and disruptive technologies for competition, productivity, structural adjustment and social structures; and highlight the various areas where governments are adapting well and where greater regulatory or policy attention is likely to be needed including innovation, infrastructure, taxation and education.

A broad range of technologies have the potential to be disruptive, from new additive manufacturing techniques to distributed energy generation and storage. However, for the purposes of this submission, we have focused on the digitally enabled economy. Digital technologies are becoming ever more embedded in the economy and society, and the pace of change is accelerating. Such advancements today, as well as the emerging technologies of tomorrow, present opportunities for the diversified economic growth Australia needs, which will help lift our economic prospects beyond the resources boom. But more importantly, digital innovation has the capacity to transform practices, raise performance and increase growth across all sectors – to the point where "the economy" and "the digital economy" are synonymous.

To this end, and coincident to the timing of the Commission's study, we published in November last year our Digital Policy Priorities Statement (**attached**), which sets out seven areas on which governments, oppositions and businesses should focus effort and reform. The Commission may find this Statement relevant and timely to its study.

Should the Commission be interested in discussing our submission further, please contact our adviser Charles Hoang (02 9466 5462, charles.hoang@aigroup.com.au).

Yours sincerely,

Peter Burn
Director, Public Policy

THE AUSTRALIAN INDUSTRY GROUP

Digital Policy Priorities Statement

November 2015

Foreword

Neither government nor industry can afford to stand still in a world of competition and opportunity. Governments have a particular responsibility to get on the front foot and lead the community debate about the 21st century economy and the changes needed to deliver it. To this end, Ai Group's Digital Policy Priorities Statement sets out the key issues on which governments and businesses should focus.

The early language of the new Prime Minister and his Ministers is very encouraging, recognising the rapid advance and pervasiveness of technology in Australia's workplaces and our personal lives and emphasising the need to foster innovation and competitiveness.

There are also promising signs of bipartisanship, with the Opposition articulating a positive vision of Australia's potential and opportunity in a more digitally enabled and globalised economy.

Australia faces important challenges and profound opportunities. We have a lot to lose if we fail to act, and we have a lot to gain by positioning ourselves well. In the Prime Minister's words, we need to embrace disruption.

There have been positive developments over the last year. We have seen the rapid advance of the digital technology platforms that are transforming businesses and governments. The NBN rollout has accelerated, laying critical infrastructure to underpin uptake of these platforms and an increasingly digitised economy. The Digital Transformation Office has been established to reorient government service delivery to meet new possibilities and expectations. And the Bureau of Communications Research is bringing new insight and rigour to our understanding of what is happening.

We have also seen challenges in catching the waves of digital growth. Our regulatory frameworks have not been agile or flexible enough to keep pace with the changing, digitising, globalising economy. Too often, we stifle innovation and competitiveness, hobble productivity, discourage investment, and make Australia a less attractive place to do business in. The recent Harper Review highlighted the challenge for policymakers and competition regulators to safeguard consumers without giving up the benefits of digital disruption.

World Economic Forum surveys have shown a distinct deterioration over the past decade in Australia's relative performance on laws relating to information and communications technology. From third place in the world in 2003-04, we sank to 28th place in 2014-15. Flexibility and global competitiveness are often lacking in our approaches to tax, intellectual property, cyber security and workplace relations. Skills shortages and the growing need for continuous re-skilling are challenges to our education and immigration systems.

Going into an election year, it is crucial that there is bipartisan action to advance near-term reforms and to build the foundation of future reform during the next Parliament to achieve a more agile, adaptable, flexible and accommodating economy. An example of where this can be achieved is improving the school curriculum and pedagogy for Science, Technology, Engineering and Mathematics, which is increasingly important for digital capabilities, competitiveness and innovation in the long term. Another is in relation to the national cyber security framework, which needs to encourage cooperation with industry rather than confrontation, and adjust to innovation rather than impeding it. The Federal Government's intention to work with industry on its Telecommunications Sector Security Reforms is an immediate opportunity to put these ideals into practice.

Innes Willox
Chief Executive

Summary

The digitally enabled economy is a global economy, where no country is guaranteed success or failure. As a prosperous, educated nation, Australia has the potential to fully participate and flourish in this global ecosystem. But according to World Economic Forum data, other countries are well ahead of Australia. Hard work is needed for Australia to be competitive in this digitally enabled economy. If Australian governments, businesses and citizens can cooperate and focus on a set of priorities to improve our position, the opportunities will be immense.

This statement sets out key priority areas for private and government action to seize the opportunities of a digitally enabled economy:

1 Digital leadership and culture

2 Legal, regulatory and standards framework

3 Infrastructure investment

4 Reliable, secure and safe environment

5 Education and skills

6 Innovation

7 Global integration

The Australian Industry Group (Ai Group) encourages wide discussion of these priorities and will use them and refresh them to guide our advocacy and activities in coming years.

Introduction

According to the Australian Government's 2015 Intergenerational Report, Australia is facing major long-term challenges with slowing economic growth, an ageing population and lower productivity growth. There are also growing pressures and opportunities from the injection of emerging economies into a more intensely globalised world and mounting environmental concerns.

And as the economy now stands, the immediate challenge for many businesses is tackling the lingering effects of the global financial crisis and the end of the resources boom. Australia is facing below-average GDP growth and rising unemployment, and a productivity growth rate that this is simply not high enough to generate the incomes growth that Australia has come to expect and that future generations may wish for. Australia's global competitiveness has also been slipping for some time, which is in part due to Australia's relatively worse productivity growth – this loss of competitiveness needs to be addressed.

Without action to foster broader sources of growth and investment in both the long and immediate terms, we face a period of decline and disappointment. To tackle these challenges, significant, urgent and farsighted structural reforms across the economy will be required to lift our long-term productivity and prosperity that meet the needs of current and future generations, and ensure that our standard of living continues to improve.

Seizing major new growth opportunities and increasing productivity will take considerable effort and innovation from the private sector. But we also need coherent and broadly supported policy frameworks at all levels of government. It is positive that there is growing interest and activity from the Commonwealth and the States focussed on potential growth sectors such as advanced manufacturing, food and agribusiness, energy, mining services and medical technology.

The digitally enabled economy is another crucial driver of growth that needs to be at the front of policy makers' minds. The Information and Communications Technology (ICT) sector is itself an important part of the economy, employing more people than mining. But digital innovation also has the capacity to transform practices, raise performance and increase growth across all sectors – to the point where "the economy" and "the digital economy" are synonymous. Digital technologies are becoming ever more embedded in the economy and society, and the pace of change is accelerating. To take a seemingly simple example, that is nonetheless profoundly transformative, affordable and internet-capable smartphones have become near-universal in Australia. Mobiles have become a platform and enabler for other transformative developments. We must leverage the potential of this uptake.

Looking beyond mobiles, consider the Internet of Things, Cloud Computing, Data Analytics, Big Data and M2M (machine-to-machine) communication – these technologies are becoming more common, developed and connected in the business world. Such advancements today, as well as emerging technologies of tomorrow, present opportunities for the diversified economic growth Australia needs.

As the National Broadband Network continues to roll out, these and other such advanced technologies and applications will be taken up by more users.

These developments create increasing potential for economically productive digital disruption and transformation in both the public and private sectors. We see this in start-ups; we see it in businesses that have changed their traditional business models in order to remain competitive – not just locally, but on a global scale; and we see it in governments as they adopt new models to deliver services.

Ai Group's members are businesses of all sizes across many sectors, and they all play a role in this digitally enhanced economy – whether they are enablers or users of digital technologies.

Individuals are leading aspects of the digital charge, from social media to crowd funding and user-generated content. Governments have a leadership role to help provide data and the physical, legal and institutional infrastructure to enable new services and help bridge any digital divide. But it is businesses that will deliver much of the broader community benefit associated

with digital technologies.

For businesses, being digitally enabled is not just about keeping up to date. Whether a business supplies digital products and services or consumes them, there are major potential benefits to pursue, including increased productivity, innovation, competitiveness and growth.

But there are also costs to be managed. Digitisation needs an investment of money and, critically for many businesses, time and focus. And it brings exposure to new or intensified challenges and risks, from privacy to cyber security. These costs and risks can hold back progress.

While some businesses are ready to embrace and manage all this, industry and governments have a role in lifting capability and building a supportive environment to help businesses continue to be sustainable and competitive in the digitally driven economy.

Ai Group has identified seven priority areas of policy focus to grow businesses in the digitally enabled economy, based on feedback from our members and research on wider Australian and international business prospects:

1 Digital leadership and culture

2 Legal, regulatory and standards framework

3 Infrastructure investment

4 Reliable, secure and safe environment

5 Education and skills

6 Innovation

7 Global integration

These are issues that deserve close attention in public debate and policy development. They will underpin Ai Group's advocacy when we talk about maximising the opportunities available in a digitally enabled economy. The digital policy priorities will continue to evolve as a living document in the years ahead.

Digital leadership and culture

Leadership in investment in and use of digital technologies can drive growth directly and inspire others. Leaders need to take charge and maximise their benefits both through strategic choices and innovative opportunities in their day-to-day operating environment.

Leadership is increasingly recognised for its contribution to innovation through improvements to operations, reformed organisational structures, new business models and embedding concepts like design thinking. Australia ranks poorly in terms of its innovation efficiency ratio i.e. efficiency in converting research dollars into innovation and commercial success – ranking 72nd out of over 140 countries according to the 2015 Global Innovation Index Report.

In a digitally enabled economy discussion, leadership means Australian businesses need to take charge and increase their efforts to integrate digital technologies into their day-to-day operating environment. This may require businesses to plan and implement long term transformative strategies, including a cultural shift. They also need to consider innovative ways to make better use of, and invest in, digital technologies to maximise its benefits. This in turn should also benefit their customers, and also have the potential of inspiring others.

While businesses have the leading role in driving growth in the digitally enabled economy, governments can also contribute by improving business confidence and helping to create the conditions for more decisive improvements in business competitiveness. Such improvements are needed to entice investment, encourage job creation, and diversify our economy to ensure resilience in the face of volatile commodity export prices.

The Federal Government's recently formed Digital Transformation Office (DTO) and similar State government programs are important initiatives to lift the economy. Better and smarter adoption of digital technologies by governments helps target resources where they are most needed and improve the experience of businesses and citizens dealing with governments. It also has the potential to increase overall productivity in the public sector and the broader economy, and to inspire the effective use of digital technologies by others.

The Bureau of Communications Research (BCR), another recent Commonwealth initiative, has been established to provide expert advice on emerging issues in a digitally enabled economy and ways in which the Federal Government can lead in this area. The BCR's work will inform the economic debate and help guide the development of an appropriate regulatory framework for driving the digitally enabled economy.

However, there is still room for improvement to ensure Australia returns to a leading position among the advanced economies.

Areas for improvement and Ai Group's activities

- Australian businesses need to be well led, with leaders aware of and able to adapt to organisational challenges. Ai Group's June 2015 policy statement Addressing Enterprise Leadership in Australia sets out barriers, challenges and collective actions for the way forward.
- The digitisation of governments creates opportunities for governments to streamline the way they collect and make use of existing data from businesses, reducing compliance and regulatory costs for businesses and governments.
- The establishment of the DTO and its aim to digitise Commonwealth services should inspire other jurisdictions to follow suit. Further benefits would come from greater transparency on how governments procure digital services, for instance through a "cloud first" policy. This will help to inform industry of what constitutes best practice.
- Ai Group has argued for the importance of improving Australia's ICT statistics through the current joint ABS and BCR Review. This would support sound decision-making in industry and governments, better inform users of the state of ICT in Australia (particularly within businesses), and provide insights into factors that contribute to economic growth.

- Ai Group's business outlook surveys and reports on Australia's digital competitiveness performance highlight areas in which Australia leads in a digitally enabled economy - and the many areas where we need to improve. We will continue to provide updates on Australia's progress.

Ai Group will continue to engage with our business members, including both ICT enablers and users, governments and other organisations to promote leadership towards a more digitally engaged economy.

Ai Group members' activities

- Ericsson is driving the "Networked Society" agenda, which promotes increasing ICT connectivity to support social, economic and environmental progress.
- Siemens is driving the Industry 4.0 agenda in Australia, which promotes the convergence between automation and digitisation.

Legal, regulatory and standards framework

Our regulatory and standards framework is fundamental to promoting investment in, and use of, digital technology. This framework needs to be sufficiently flexible to accommodate rapid changes in technologies that lead to new types of business models and competition, while also protecting consumers' interests.

The Harper review and Ai Group's analysis of findings from the 2015 World Economic Forum report highlight that Australia's current laws and regulations are not sufficiently flexible to both protect consumer interests and accommodate for rapid changes in technologies that lead to new types of business models and competition.

Standards are also fundamental to promoting a digitally enabled economy because they can promote an ecosystem for technological innovation, competition, international trade and interoperability. Standards when called up by regulation offer a mechanism to quickly respond to changing markets.

A great deal of the work in standards that is occurring globally seeks to address what are broad systems approaches to significant challenges, including Factories of the Future; Smart Grids and Smart Cities; the Internet of Things; and Big Data. These challenges require a new level of coordination and effort, and development of new ways to exchange knowledge for the public and private sectors, academia, standards and conformity institutions.

Any proposed laws, regulations and standards impacting digitised businesses, including tax reforms, workplace relations and employment arrangements, need to address current concerns, while still welcoming investment and allowing businesses to remain competitive in a dynamic globally connected environment. Below are examples of the need for improvement.

Areas for improvement and Ai Group's activities

- *Privacy regulation* issues will intensify with the growing pervasiveness of digital technologies in our society. Government intervention can ease or exacerbate these issues. Without proper governance, there could be increased risks and costs for businesses to manage compliance with government requirements, including with respect to data retention, while protecting privacy and security. Current privacy regulation should be further clarified to strike the right balance between protecting consumers and promoting investment in digital innovation and productivity.
- *Copyright regulation* plays an important role in determining the level of innovation that can occur in the digitally enabled economy and the type of activities that are permitted. Australia needs a more flexible and less technology-specific model for copyright law, whilst also respecting the rights of copyright creators and rights holders and avoiding undercutting the commercial incentive to create.
- *Taxation reform* offers substantial national benefits and for several years Ai Group has argued that this should be the highest national reform priority. A more digitised economy presents additional challenges to Australia's tax system. In light of the Government's White Paper processes on taxation and the Federation, we are consulting our members on whether we should add to or modify our current tax priorities which focus on the importance of reducing the company tax rate; decreasing Australia's reliance on income taxation; removing inefficient taxes - particularly those levied by State and territory governments; and reducing compliance costs on businesses. In addition, Ai Group has a long-standing record of support for the R&D Tax Incentive; further innovation options in the tax system are discussed below.
- *Workplace relations and employment arrangements* are vital. Without appropriate workplace relations structures, it is difficult to maximise the benefits of digital technology. Teleworking is an example of the potential for digital technology to change in work practices; ride sharing services are another.

Digitally driven businesses challenge and are challenged by the existing regulatory framework of relatively inflexible awards, entitlements and practices. For example, most employees working for these businesses are employed under common law contracts; the Fair Work Act inappropriately gives primacy to collective bargaining and collective agreements over such common law contracts.

Transfer of business laws impedes the transfer of employees to other entities within a corporate group, including outsourcing of ICT activities to specialists.

There are also limitations in long service leave laws in some States, which appear to require recognition of overseas service, and this presents a significant problem for digitised companies who often transfer employees from overseas to Australia. These businesses have also had claims pursued against them by unions and portable long service leave schemes in the construction industry on the basis of the false assertion that ICT work is in essence "electrical contracting" work.

- *Spectrum and media/content regulation* needs to be flexible enough to support and manage growth in the number and usage of new communications technologies, particularly the increased need for wireless connectivity between new devices. For instance, Ai Group's submission to the Digital TV Regulation Review supported a pathway to longer term extremely spectrum-efficient broadcast technologies (HEVC and DVB-T2), accompanied by a more immediate move to mature and widespread technologies that allow improved spectrum efficiency and improved quality (MPEG-4).
- *International standards development and participation*. With the increasing globalisation of supply chains and a continual drive for innovation and productivity, trusted international standards will be increasingly relied on to disseminate knowledge, underpin cross border trade, provide a reference architecture, and guarantee the interoperability of technological systems. It is vital that Australian industry and consumers have support and access to all international fora involved in standards development (particularly the International Electrotechnical Commission (IEC)) to ensure our national interests are preserved. This will allow for effective contribution to standards development at an ideal stage in which the product and services are still under development. Australia is generally known to play a strong role in standards development. Accelerating technological change makes this role even more important to facilitate fast adoption of new technology and realisation of its benefits.

Ai Group will continue to identify areas in law, regulations, standards and policy more generally that may impact on our members' participation in a digitally enabled economy, and provide an influential voice for our members in these areas.

Infrastructure investment

Infrastructure investment, especially in broadband, is an important enabler of a digitally enabled economy. Greater attention needs to be paid both to the delivery of high-speed broadband and to maximising benefits flowing from that.

Whether public or private, infrastructure investment (especially in wired broadband, pervasive Wi Fi and future 5G mobile networks) is an important enabler of a digitally enabled economy. Greater attention needs to be paid to the delivery of high-speed broadband to Australian businesses, and to boosting business readiness to realise the benefits of high speed broadband. Connecting residential users will also allow business growth. Otherwise, Australia will be unlikely to make the most of the benefits that flow from high speed broadband.

Infrastructure investment is required to meet the challenges of growth. Low finance costs and weak engineering construction activity mean that Australian governments have a huge opportunity to invest more in infrastructure projects of national benefit.

In the lead up to the last Federal election, there was intense uncertainty over future government policy on preferred broadband technologies. Businesses find it hard to deal with short political and electoral timeframes at all levels of government, where long term infrastructure decisions are often revisited or unpicked following a change of government – even where contracts have been signed. This hurts businesses who have deeply committed to participation and who have made decisions over horizons of more than three years.

All regions should be treated equitably with the rollout of high speed broadband. Ai Group's 2013 survey of businesses highlighted that a high priority should be given to connecting poorly served businesses and industrial estates in outer suburban and regional areas. Otherwise, there will be a growing digital divide between business communities – a new face on the tyranny of distance.

We still receive feedback from regional and outer suburban areas that they are losing out because the NBN is not present in their areas. Some of these areas have no broadband connection at all, a serious disadvantage that highlights the importance of an accelerating NBN rollout.

Areas for improvement and Ai Group's activities

- Industry needs bipartisan support for a stable regulatory and policy environment on broadband, in which there is minimal political disruption to the swift rollout of the NBN to all regions in an equitable manner. This will ensure continuity, certainty and confidence for businesses who deliver the infrastructure, and increased readiness by other businesses to make the most out of the infrastructure and the new technologies and applications it supports.
- At a broader scale, there is a strong case for investments in productivity-enhancing infrastructure to boost activity and provide a pipeline of work for industry, while addressing the infrastructure deficit that burdens industry and households throughout Australia. Commitments to new infrastructure projects are vitally needed and would also boost activity in the near-term at a time of slow activity. Unfortunately commitments and spending are lagging behind need and opportunity at all levels of government.
- Proper process around infrastructure decisions remains vital; all jurisdictions should adopt a fully transparent approach to infrastructure provision, ensuring proposed projects are identified and prioritised on the basis of a rigorous and transparent cost benefit analysis.

Ai Group members' activities

With respect to the rollout of the NBN, our members range from enablers to users. On the supply side, this includes businesses hired by NBN Co to build the network's various components, and businesses offering ICT products or services that benefit from high speed broadband such as cloud technology. On the demand side, this includes businesses who use high speed broadband in order to provide products or services to customers.

Reliable, secure and safe environment

Businesses require a digital environment that is sufficiently reliable, secure and safe to maintain the confidence of all types of user. As digital technologies continue to evolve, businesses and governments need to work together to manage cyber security, resilience and safety.

Whilst it is important to encourage businesses and governments to look into ways to maximise their use of digital technologies, businesses also understand the economic and social imperative to ensure that the digital environment is sufficiently reliable, secure and safe to maintain confidence. Protecting the interests of businesses and citizens is important in its own right, and will also enhance the expected benefits of the digitally enabled economy - such as the increased use of technology to improve outcomes in areas such as healthcare and the environment.

To this end, as digital technologies continue to evolve, businesses and governments need to work together to have in place an appropriate framework for managing cyber security, resilience and safety. The increased use of e-commerce, cloud computing, the Internet of Things, Big Data and data retention will also require proper attention be given to data protection, privacy, security and protection against fraud.

Areas for improvement and Ai Group's activities

Ai Group has participated in the Australian Government's Cyber Security Review and made a joint industry submission on the Government's Telecommunications Sector Security Reforms initiative. We have identified the following essential elements of a well-designed cyber security framework:

- Building collaboration on cyber security between governments and businesses, rather than taking a punitive and heavy handed approach.
- Ensuring cyber security legislation and policy provide the flexibility needed for innovation and integration of new technologies, such as software-defined networks.
- Improving data on the extent of cyber security issues and readiness to respond to such issues.
- Raising awareness of cyber security issues amongst the Australian public.
- Developing guidance for each business sector on best practice and standards for managing cyber security, informed by proper stakeholder consultation.
- International cooperation to develop best practice and standards to enable collaboration and information sharing with respect to cyber security.

This is an area of interest for all Ai Group members, whether inside the ICT sector or not. For instance, we receive regular feedback from SMEs who would appreciate greater clarity from governments on suitable cyber security arrangements as required under the Entrepreneurs' Programme.

Ai Group will continue to identify opportunities to influence and collaborate on behalf of businesses with governments and other organisations to promote a reliable, secure and safe digital environment.

Ai Group members' activities

Cyber security is a particularly important issue for member businesses that provide, facilitate or use online services such as cloud computing.

- Cisco publishes an annual report on the current state of security threats and the preparedness of businesses and other users.

- Ericsson published a white paper on guiding principles for security in a networked society.
- IBM publishes an annual Cyber Security Intelligence Index, which provides a high-level overview of the major threats trending across businesses worldwide over the year.
- Telstra's annual report on cyber security aims to uncover the pressures and challenges facing IT security professionals and the organisations they protect. Telstra has developed a framework which aims to be an easy, accessible non-technical approach that can be used to effectively manage cyber security risk from the Board down.

Education and skills

Science, Technology, Engineering and Mathematics (STEM) are increasingly important for digital capabilities, competitiveness and innovation in the long term. A more engaging school curriculum and pedagogy to attract students to STEM should be developed and the qualified STEM teaching workforce needs to be increased.

In the immediate term, there should be targeted investments in digital capabilities including awareness raising and training, and a skilled migration program will also have an essential role to play.

Digital disruption is now considered a megatrend which is radically changing the way we live, consume and work. According to the PwC's 2015 report, "A smart move – Future-proofing Australia's workforce by growing skills in STEM", businesses are finding it difficult to adjust to these pressures and consider this difficulty to be a major threat to their growth: 79 per cent of CEOs are concerned about the impact of changes in core technology; 74 per cent say the lack of key technology skills is a threat; and 67 per cent are concerned about the speed of technological change.

Building competence and confidence in STEM is a long term challenge. STEM is increasingly important for digital capabilities, competitiveness and innovation. In this area, Australia is under performing compared to our international peers, with decreasing participation and performance by students at all levels.

Existing workers and managers can also improve their skills, and need to do so if businesses are to make the most of broadband and other opportunities. "ICT professional" is one of the fastest growing occupations in Australia and, together with other STEM-related occupations, grew at about 1.5 times the rate of other jobs in recent years. Notwithstanding this, surveyed employers continue to report difficulties in recruiting STEM-qualified staff, especially technicians and trade workers. In the immediate term, there should be targeted investments in digital capabilities including awareness raising and training.

In the immediate term, while training our own workers should be our highest priority, skills gaps in a digitally enabled economy persist and a skilled migration program has an essential role to play. Easing near-term bottlenecks by bringing in assistance from highly trained workers from overseas facilitates higher growth and better products and services. It can also provide spillover benefits including further development of local knowledge and expertise.

Areas for improvement and Ai Group's activities

- To attract students to STEM, a more engaging school curriculum and pedagogy should be developed and the qualified STEM teaching workforce needs to be increased, as recommended in Ai Group's recent influential review of STEM skills in Australia.
- Ai Group is looking at connecting schools to industry in STEM skills partnerships to enable students to better appreciate the opportunities associated with employment in STEM-related areas. During 2016, Ai Group will coordinate a series of school - industry pilot programs to lift student participation in this area.
- The Pathways in Technology Early College High School (P-TECH) model will be piloted in two schools in Victoria. The IBM-originated P-TECH model features a focus on topics rather than subjects, which has potential to achieve the integrated teaching that STEM disciples require.
- Ai Group will engage with the Australian Government's Maths by Inquiry initiative which seeks a definitive change in the culture of mathematics teaching and the development of resources to focus on the importance of problem-solving.
- Where gaps in business and worker skills and capabilities exist, targeted assistance is warranted. Initiatives like the Digital Business Kits, Entrepreneurs' Programme and Industry Skills Fund are supported by Ai Group and should continue.

- Ai Group has had a very influential role in addressing skills gaps, including on the Government's immigration review into 457 visas.
- There may be other opportunities through existing government initiatives that are not being exploited to take advantage of the shift in skills required for a digitally engaged economy. For instance, with the transition in the car manufacturing industry, a Growth Fund was established to support workers, businesses and regions. Such funding could be applied to the shortfall in ICT skills.

We will continue to engage with businesses, governments and other organisations to identify and influence how these opportunities for growth can be maximised for our members.

Ai Group members' activities

- Alcatel-Lucent sponsors the Centre for Energy-Efficient Telecommunications with the University of Melbourne, which is used to address the projected growth in energy consumption linked to surging Internet demand.
- Cisco has announced a five-year $31m program to increase the pool of talent with STEM skills.
- Google funds workshops that equip teachers to teach computer science through its Computer Science for High Schools (CS4HS) program. Google also provides free online professional teacher development in partnership with Adelaide University.
- IBM developed the P-TECH model in the United States and has announced support for its implementation at schools in Australia.
- Siemens has announced a competition to engage students in STEM through "experiential" learning opportunities, which include rewarding winners with $100K worth of stationary bikes that generate electricity.

Innovation

Digital technologies are an enabler to innovation, which is itself essential for sustained growth in individual businesses, broader sectors and Australia as a whole. We need to harness a wider range of capabilities through better collaboration between businesses, researchers and governments, and put this in service to a clear strategic agenda. Public policy support for innovation should be stable and informed by strategy, and should address all parts of the innovation system.

Innovation is essential for sustained growth, whether in an individual business, a sector or Australia as a whole. Part of this is the development and use of wholly new products, processes and practices that can give a global edge. Another aspect is the rapid adoption and adaptation of productive innovation from outside the firm, sector or nation. Australia can make important and novel contributions; Wi-Fi and Google Maps were both developed here. But we can also make the most of innovation from around the world. Both origination and adoption of innovation are becoming more important given the rapid pace of change in markets, customer expectations, and competitor capabilities in a digitising world.

Putting more resources into innovation can help, but only if they are well deployed. What is needed from businesses, researchers and governments is leadership to harness a wider range of capabilities through better collaboration in service to a clear strategic agenda supported by a stable policy framework.

Areas for improvement and Ai Group's activities

- The repeated review, reworking, repeal or rebranding of innovation policy by every incoming government in recent decades needs to give way to a greater emphasis on continuity. While improving innovation policies and investment is vital, the absence of stability has reduced confidence in public policy.
- Changes are particularly problematic where they lack a policy rationale, as in the currently proposed savings measure to reduce the R&D Tax Concession by 1.5 per cent. The Concession has been heavily and repeatedly modified in recent years; the latest proposal originated as part of now-scrapped plans to cut the underlying company tax rate by 1.5 per cent, and should be dropped.
- Tax reform discussions should fully consider options for boosting innovation that complement the R&D Tax Concession, including for instance the "patent box" and related approaches that encourage commercialisation with lower company tax rates for profits derived from intellectual property or other identifiable innovation.
- Collaboration is a major driver of successful innovation, whether business-to-business or between businesses and research organisations. Australia's collaboration performance is very low and improvement is urgent. Higher performance requires:
    - Businesses to think harder about their goals and practices and connect collaboration and innovation directly to high level decisions on their commercial strategy;
    - Public sector researchers to be funded on the basis of real-world impact as well as publication and citation, and to be more focussed on fostering broader and longer-term relationships with industry and less focussed on retaining intellectual property; and
    - Governments to put collaboration at the heart of its innovation and business improvement policies.

  Forthcoming Ai Group research will examine real-world experience of the factors behind successful innovation collaboration and draw lessons for policy.
- The new Industry Growth Centres, along with similar initiatives by some States and major reforms to the Cooperative Research Centres (CRC) Programme, are excellent opportunities to build and reinforce collaboration with the research sector, both across and within industries.

ICT is not one of the growth sectors identified by these policies; but it is an essential enabler of innovation and higher performance in each sector and across industries, which is where ICT gains have shown significant advances. The Growth Centres should build connections to the ICT sector, and the reformed CRC Programme should make good on the recent Miles Review's recommendation to retain scope for CRCs outside existing identified growth areas.

Ai Group will continue pursuing opportunities for our members between businesses, governments and other organisations to encourage greater cross–industry innovation and collaboration for digital and ICT related R&D. This may also have flow-on benefits such as attracting people to STEM-related education and research.

Ai Group members' activities

- Alcatel-Lucent convenes the ng Connect Program, which brings innovative companies together to collaborate on solution concepts, business models and market trials. The Program has built an ecosystem that enables member companies to develop new products and services faster, and with a higher profile to customers.
- Siemens has established a new energy service centre, located in South Australia's Tonsley technology park development, promoting collaboration between like-minded companies and academic institutions for greater innovation in the State.
- Data61 (formerly NICTA) encourages open innovation and links between universities, research organisations and small and large businesses. For instance, Data61's latest Knowledge Hub, the Transport and Logistics Living Lab in Sydney, launched in May 2015. Data61 is also a foundation member of the Canberra Innovation network. Data61 staff also dedicate personal time to supporting outreach activities in schools and social enterprises, as well as running hackathons such as GovHack.

Global integration

The deep international connectedness of a digitally enabled economy means that no one country or industry can develop policies in isolation. Australia needs a global outlook on digitally enabled economy issues – some of which can best be addressed in a collective manner across the world.

The digitally enabled economy is not always as borderless as we imagine, as those who encounter geo-blocking or the Great Firewall of China can attest. But it is at least globally connected, and Australia needs a global outlook on digitally enabled economy issues. Some of those issues can best be addressed in a collective manner across the world.

Areas for improvement and Ai Group's activities

- Government digital policies need to be developed with a close eye to experience, interconnections and expectations overseas. Incorporating UK experience into the new Digital Transformation Office is positive, as is a move to require all agencies to consider whether trusted international standards are suitable for adoption. By contrast the initial TSSR proposal failed to learn from leading international practice in business-government cooperation.
- Ai Group is a Partner Institute with the World Economic Forum, and publishes an annual report on Australia's digital competitiveness. This data underpins our advocacy to rectify underperformance and improve Australia's position relative to the other advanced economies.
- Exports remain important to growth in a digitally enabled economy. The current negotiation on the Trans-Pacific Partnership (TPP) is one example in which the outcome could act as inhibitor or opportunity. For example, there is concern across the board about the impact an agreement will have on the copyright and e-commerce laws of each signatory.
- Ai Group is also part of the global B20 dialogue and the agenda-leading B20 Coalition, whose international position paper on the digital economy policy needs of key B20 economies launched in June 2015. Those needs resonate with Ai Group's Australian priorities:
    - Safeguarding creativity and innovation;
    - Broadening the knowledge and skill horizon;
    - Building multi-tier technology systems for SMEs;
    - Facilitating investment and infrastructure;
    - Securing the digital environment;
    - Expanding the borders;
    - Addressing taxation Issues; and
    - Legislating in a digital world.

    The B20 Coalition's policy paper has many points of crossover and connection with the domestic priorities we have outlined. Australians should read it with interest. Where feasible, Ai Group will ensure that a consistent approach be taken between our digital policy work domestically and globally.

Ai Group members' activities

- Cisco publishes a Visual Networking Index (VNI) which forecasts and analyses the growth and use of IP networks worldwide.
- Ericsson publishes an annual global Networked Society City Index, which examines and ranks 40 world cities, providing a framework for measuring ICT maturity in relation to social, economic and environmental progress.

- Siemens has played a leading role in building international relationships, particularly through the Australian Germany Advisory Council, and has brought international trends like Germany's Industry 4.0 agenda to greater attention in Australia.

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