

PARLIAMENT OF SOUTH AUSTRALIA
Economic and Finance Committee

**INQUIRY INTO THE NATIONAL
BROADBAND NETWORK**

Response by the
Australian Computer Society Inc
19 December 2014

CONTENTS PAGE

1.	<u>EXECUTIVE SUMMARY</u>	<u>3</u>
2.	<u>WHO IS THE AUSTRALIAN COMPUTER SOCIETY (ACS)?</u>	<u>6</u>
3.	<u>TERMS OF REFERENCE.....</u>	<u>6</u>
4.	<u>BACKGROUND INFORMATION</u>	<u>8</u>
4.1	REVISED NBN GUIDELINES.....	8
4.2	BROADBAND AND ECONOMIC GROWTH.....	8
4.3	SOUTH AUSTRALIA – STATE OF THE ECONOMY	9
4.4	THE IMPORTANCE OF ICT SKILLS.....	10
5.	<u>ACS SUGGESTED RESPONSE.....</u>	<u>13</u>
5.1	THE EDUCATION AND TRAINING SYSTEM	13
5.1.1	PRIMARY & SECONDARY SCHOOL	14
5.1.2	THE VET SYSTEM	15
5.1.3	THE TERTIARY EDUCATION SECTOR	16
5.2	WORKFORCE DEVELOPMENT PLANNING.....	18
5.3	DIGITAL LITERACY OF SMALL AND MEDIUM ENTERPRISES (SMEs)	19
5.4	COLLABORATION BETWEEN INDUSTRY, UNIVERSITIES & OTHER RESEARCH ORGANISATIONS.....	21
5.5	ICT PROFESSIONALISM.....	22
5.6	IMPROVED PUBLIC & PRIVATE SECTOR ENGAGEMENT	23
6.	<u>OTHER MATTERS.....</u>	<u>23</u>
6.1	DELIVERY OF GOVERNMENT SERVICES	23
6.2	ENVIRONMENTAL BENEFITS.....	24
6.3	MORE BUSINESS OPPORTUNITIES	25
6.4	SOCIAL, COMMUNITY & REGIONAL BENEFITS	25

1. EXECUTIVE SUMMARY

The Australian Computer Society (ACS) welcomes this opportunity to provide input to the South Australian Parliament's Inquiry into the impact of the National Broadband Network (NBN) on the South Australian economy. The Parliament is to be commended for this timely review. High speed, ubiquitous broadband is now a "game changer" in the quest for stronger economic growth and higher living standards. And whilst there is ongoing debate about the appropriate mix of technologies to use and the business model which might be most effective, the ACS' view is that irrespective of that debate consumers will continue to have access to higher and higher broadband speeds (fixed and wireless). The policy debate therefore, in our view, must be less on the infrastructure issues and far more on how to best leverage high speed, pervasive broadband for the benefit of the South Australian economy and its citizens.

In this context, the ACS welcomes the announcement on Friday 5 December 2014 by the South Australian Premier, the Hon Jay Weatherill MP, and Minister for Employment, Higher Education and Skills and Minister for Science and Information Economy, the Hon Gail Gago MP. They announced the details of one of the Government's economic priorities: *The Knowledge State – attracting a diverse student body and commercialising our research*. ACS is particularly encouraged by the following statement:

"We must develop our human capital by striving to grow the numbers of local and international students, particularly those studying science, technology, engineering and maths subjects in our schools, training institutions and universities, and establish an international reputation for the quality of our educational institutions.

*Technology is integral to developing a knowledge-based state. Our ambition is that Adelaide be one of the world's 'Smart Digital Cities', achieved through partnerships with global technology companies."*¹

This statement is a clear recognition of the importance of ICT and other technically based skills to developing a successful, modern economy. It provides an ideal policy platform and philosophy on which South Australia can work to establish a truly digital ready and enabled economy. And whilst there have been significant amendments to the original NBN rollout plan, the current NBN framework and planning still represent a great opportunity for South Australia to establish itself as a leading knowledge-based economy.

To capitalise on these opportunities, the ACS' view is that the biggest single influencing factor will be the quantity and quality of the State's human capital base, and in particular, having an adequate supply of skilled ICT professionals and a generally digitally literate population. This is now being recognised globally as the key to sustained future economic growth. The Australian Chief Scientist in his September 2014 Report "Science, Technology, Engineering and Mathematics: Australia's Future", noted that "It is estimated, for example, that scientific and technological advances have produced roughly half of all US economic growth in the last 50 years. In Australia, 65 per cent of economic growth per capita from 1964 to 2005 can be ascribed to improvements in our use

¹ <http://economic.priorities.sa.gov.au>

of capital, labour and technological innovation—made possible in large part by Science, Technology, Engineering and Mathematics (STEM).”²

In addition, in Europe it is estimated that STEM based occupations are expected to grow by 14% by 2020 compared to 3% for other occupations. In the United States, employment in STEM occupations is projected to grow almost as fast between 2008 and 2018 as employment in all other occupations combined³.

There is, however, a “dark” side to the story of the digitally powered economies and the emerging demand for more knowledge based roles. And that is that much of the growth is and will come at the expense of older, established industries and occupations. “Digital disruption” is the commonly used term to describe this phenomenon.

The Training and Skills Commission in South Australia in its December 2014 Report notes that:

“The South Australian economy is at a crossroads.”

“In this critical period of economic transition we are more than ever reliant on the skills and productivity of our people. The jobs of today will be different in the future.”⁴

In terms of industries most susceptible to digital disruption, the Deloitte Australia 2012 Report *“Digital Disruption, Short Fuse, Big Bang?”* is particularly insightful and to some extent ominous. Deloitte found that of the industries in Australia likely to be most impacted by technology advancements, five of them are of above average significance in the South Australian economy (as measured by share of GDP). These industries are Retail Trade, Education, Agriculture, Government Services, and Utilities. So whilst job losses will occur nationally in these industries, the relative impact in South Australia can be expected to be more acute than in some other States. And whilst manufacturing is considered by Deloitte to be relatively less digitally exposed (ie small bang), South Australia’s heavy reliance on the automotive industry will also see significant job losses in that sector over the coming years.⁵

In terms of occupations likely to be most disrupted, no-one can be entirely sure what the impacts of advancing technology will be at an individual occupation level. But what is clear is that significant disruption is and will continue to occur. A 2013 study by Dr Carl Benedikt Frey and Dr Michael Osborne at the University of Oxford examined 702 professions in the United States and found that 47 per cent were at risk of being replaced with computerized systems.⁶ South Australia, like all other jurisdictions, will certainly be subject to similar impacts.

So the challenge is twofold. First, how to fill the new, knowledge based occupations that are now emerging. And second, how to reskill and retrain workers who will lose their jobs in coming years but who still need gainful, satisfying employment.

² http://www.chiefscientist.gov.au/wp-content/uploads/STEM_AustraliasFuture_Sept2014_Web.pdf

³ http://www.esa.doc.gov/sites/default/files/reports/documents/stemfinaljuly14_1.pdf

⁴ http://www.tasc.sa.gov.au/DesktopModules/Bring2mind/DMX/Download.aspx?Command=Core_Download&EntryId=567&PortalId=5&TabId=1047 (page 6)

⁵ <http://www2.deloitte.com/content/dam/Deloitte/au/Documents/Building%20Lucky%20Country/deloitte-au-consulting-digital-disruption-whitepaper-0912.pdf>

⁶ <http://www.futuretech.ox.ac.uk/news-release-oxford-martin-school-study-shows-nearly-half-us-jobs-could-be-risk-computerisation>

The ACS **recommends** the following initiatives:

1. Changes to the **education and training system** to help ensure it delivers the necessary supply of skilled ICT professionals as well as high levels of ICT literacy in the workforce. Specifically ACS recommends:
 - a. Including a Digital Technologies subject as a mandatory element of primary and secondary school curriculum;
 - b. VET providers to ensure all courses place a strong focus on base ICT skills and competencies so that in a fast changing, digitally driven world graduates are not left “unqualified” for the jobs of tomorrow; and
 - c. Establishing a Forum of Government, industry, employer and education stakeholders to work up initiatives to help ensure ICT students (tertiary and VET) have greater exposure to work-integrated learning (WIL) through initiatives like internships. This helps graduates work-readiness by ensuring they have a mix of not only the deeper technical skills but also the critical ‘soft skills’ like project management, problem solving, stakeholder management and strategic and creative thinking.

2. To assist with workforce planning, research be commissioned which seeks to identify the skills the South Australian economy is likely to need in the next 5-10 years. The project, to be undertaken as a joint initiative of Government, industry, the education sector, community groups and relevant professional societies, would involve three key elements:
 - a. Identifying plausible trends and scenarios for employment in the State in light of accelerating advancement of digital technologies;
 - b. Identifying the types of jobs at risk, the types of jobs likely to become more important, what new jobs will be created, and impacts on demographic sector in the State; and
 - c. Identifying and proposing transition pathways for industry, government and community sectors to achieve better outcomes.

3. To improve the digital literacy of SMEs, a program be developed which includes the following key elements:
 - working with individual businesses to benchmark their digital literacy and identify their specific areas of weakness
 - based on 1, help broker for them relationships with relevant “best in breed” ICT suppliers
 - the program be delivered on a regional basis and involve collaboration between State Government, ACS, and SME diagnostic specialists working with local stakeholders such as local governments, chambers of commerce and industry sectoral bodies.
 - The program to be initially seed funded by Government, but with ownership and funding arrangements transitioned over time to the local stakeholder community.

4. To ensure minimum levels of ICT competence and professionalism and therefore reduce risk of ICT systems failures, the South Australian Government work with the ACS and employer and standards setting bodies on establishing a system for ensuring that senior ICT roles in Government agencies can only be filled by people who meet agreed accreditation standards.

5. The South Australian Government establish a Digital Policy Advisory Council, comprising members from the ICT industry, broader employer groups, the education sector, the community sector and the ACS as the professional society for ICT. The remit of the Council should be to provide advice on the digital readiness of the South Australian economy and make recommendations to Government to help ensure South Australia takes full advantage of the opportunities presented by digital technologies.

2. WHO IS THE AUSTRALIAN COMPUTER SOCIETY (ACS)?

The ACS was formed in 1966 and is Australia's peak body for ICT professionals with over 22,000 members and a national footprint. Like all professional bodies, a core function of the ACS is the assessment and accreditation of its members as Certified Technologists or Certified Professionals. Assessments are conducted against an internationally accepted framework called Skills Framework for the Information Age (SFIA). To retain professional status ACS requires certified members to undertake ongoing professional development activities. For more information about the ACS, please see www.acs.org.au.

ACS is also member of key international ICT bodies including;

- the International Federation for Information Processing (IFIP) which represents IT Societies from 56 countries or regions, covering all 5 continents with a total membership of over half a million. See http://www.ifip.org/index.php?option=com_content&task=view&id=160&Itemid=480
- South East Asia Regional Computer Confederation (SEARCC) which is a forum of national Information Technology professional societies in the Asia Pacific region. See <http://www.searcc.org/>

ACS also conducts research-based advocacy on behalf of members on ICT and skills related issues, and is increasingly working more with Australian workplaces (public and private) to help them with their ICT workforce planning and training needs.

ACS is responsible for the professional accreditation of ICT degrees in Australia. It has accredited 950 education programs at a range of Australian universities and a number of registered training organisations (RTOs) that provide higher education degrees in ICT. ACS works closely with the Tertiary Education Quality Standards Agency (TEQSA) to align courses with national standards. It also works with the Australian Council of Deans of ICT in the accreditation process.

3. TERMS OF REFERENCE

The Terms of Reference (ToR) for the Inquiry are as follows:

1. How the delivery of the National Broadband Network can contribute to South Australia's:
 - Economic growth, entrepreneurship and employment opportunities, in metropolitan and regional areas;
 - Business efficiencies and revenues, particularly for small and medium businesses and sole-traders;
 - Research, development and innovation;
 - Productivity and workforce participation;
 - Delivery of government services and programs, including health, education and training

2. What policy, program and other enablers will need to be in place to maximise these benefits for South Australia.
3. What the impact will be on South Australia from the changes to the structure and schedule of the Federal Government's National Broadband Network program, particularly ending the rollout of fibre-to-the-premises.
4. Any other relevant matter.

ACS proposes to comment principally in relation to items 1 and 2 of the ToR, and to a lesser extent, item 4.

4. BACKGROUND INFORMATION

Before discussing the particular issues the ACS sees as important, it is useful to firstly outline some relevant background information.

4.1 Revised NBN Guidelines

New construction guidelines released in November 2014 by NBN indicate that fibre-to-the-premise (FTTP) rollout plans for homes and businesses contained in ‘advanced planning stages’ and where FTTP has already been deployed, will continue. This is likely only to be in larger metro areas.

Homes and businesses already served by Hybrid Fibre Coaxial (HFC) will receive their broadband services over that technology. Other customers will remain part of the fixed wireless or satellite rollout. There are arrangements for businesses requiring specific speed rates to pay extra for FTTP and small communities can co-fund FTTP if they are in an alternative technology rollout area.

This effectively means that the vast majority of consumers and businesses (90 per cent) will receive fibre to the node (FTTN), reliant on the existing copper network, at speeds of at least 50 megabits per second by 2019. Multi-unit dwellings will receive fibre to the basement.

NBN has made it clear that it’s revised focus is to optimise the benefits of the digital economy by addressing under-penetration of access, universal access, sufficient but not excessive speeds, affordability and time to build. The multi-technology mix (MTM) supports this objective.

In terms of NBN rollout in South Australia, NBN indicated in September this year that 8,200 homes and businesses were connected to the network at that time, and further 6,400 connections were scheduled for the coming months.

4.2 Broadband and Economic Growth

Internet speeds and interconnectedness are increasing, costs are declining, applications are becoming more sophisticated and more diverse, and new smart devices proliferate. The transformative impacts of high speed broadband are indisputable. High speed broadband is now widely acknowledged as a necessary pre-requisite for productivity growth, economic sustainability and international competitiveness in the 21st century.

In the same way that the industrial revolution transformed the underlying economics of business sectors, stimulated profound social and environmental change and drove innovation and growth in human capital – so too will the current digital revolution. The potential of digital technologies in this context is game changing. It is not simply about doing more of what we do now online, or doing it faster. It is about *doing things differently* and doing things never previously envisaged. Underpinned by the NBN it is about moving from “e” (electronic) to “u” (ubiquitous) access where everyone and everything is connected.

4.3 South Australia – State of the Economy

CommSec’s October 2014 “State of the States” reports indicates that the South Australia economy generally ranks between sixth and eighth nationally on the key economic indicators. CommSec analyses how each economy is performing compared with “normal”, and like the Reserve Bank does with interest rates it uses decade-averages as the measure of “normal.” On this basis the October report for South Australia indicates the following⁷:

- economic activity was up just over 9 per cent on its "normal" or average output over the past decade. This places it ahead of only Tasmania.
- the weakest result nationally on retail spending, up just 4.2 per cent on the decade average
- equipment investment is down 9.2 per cent, ahead of only ACT and Tasmania
- population growth at 3.3 per cent below the decade average puts it ahead of only Tasmania
- dwelling starts, whilst up 4.9 per cent on the decade average, are the lowest growth except for Tasmania.

The only slight positive is the jobless rate which has fallen from 6.8 per cent in May to a 15-month low of 6.3 per cent in September. Further, South Australia has the third lowest growth in unemployment, even though the current jobless rate is up almost 16 per cent on the decade average of 5.4 per cent.

The take out message from these indicators is an economy which for at least a decade has been underperforming compared to other Australian jurisdictions. As such, the State clearly needs something to “jump start” it and to generate growth and other economic trajectories more in line with competitor economies. ACS’ view is the answer lies in a genuine focus in evolving South Australia into a knowledge economy. An economy powered by innovation, entrepreneurship, research excellence, a highly digitally literate human capital base, has leading edge ICT capabilities, and is fed by a high performing and agile education and training system.

In terms of the industry sectors South Australia is most reliant on, data from the South Australian Centre for Economic Studies⁸ indicates that in terms of share of Gross State Product, the most significant industries are:

- manufacturing 8.2% (cf 7.3% nationally)
- health care & social assistance 7.8% (cf 6.8%)
- construction 7.4% (cf 8.1%)
- financial and insurance services 7.35% (cf 8.5%)
- public administration & safety 5.8% (cf 5.5%)
- education & training 5.1% (cf 4.8%)
- retail 5% (cf 4.8%)

⁷ https://www.commssec.com.au/content/dam/EN/campaigns/stateofstates.pdf?cid=123849:commssec:public:Public_Home:::State_of_the_States:Download_Bottom

⁸ <http://www.adelaide.edu.au/saces/economy/industry/>

And Australian Bureau of Statistics data from the 2011 Census⁹ indicates the largest employing industries in South Australia are:

- health care and social assistance - 13.6%
- retail trade - 11.2%
- manufacturing - 10.5%
- education and training - 7.9%
- construction - 7.5%
- public administration & safety - 7.1%

4.4 The Importance of ICT Skills

ICT and computing skills - which are part of the STEM set of skills - are core to successful economies in an age where digital technologies dominate. Yet it is estimated that in Europe, while STEM occupations are expected to grow by 14% by 2020 (compared to 3% for other occupations), the supply of workers with education qualifications in STEM subjects is projected to actually fall¹⁰. In the United States, employment in these STEM occupations is projected to grow almost as fast between 2008 and 2018 as employment in all other occupations combined¹¹. Further, the European Commission estimates that by 2020, there will be 900,000 jobs in the European ICT sector unfilled due to a lack of appropriately skilled workers.¹²

A 2013 report by the Australian Workforce and Productivity Agency (AWPA) estimated Australia faces similar challenges in relation to its supply of skilled ICT workers. The AWPA analysis indicates total ICT workforce growth is expected to be 33,200 or 7.1 percent growth between 2012 and 2017. Employment of ICT professionals is expected to grow by 9.5 per cent, or 21,400 workers during the same period.¹³

However, domestic supply to this market will most likely not match this demand. This is due in large part to a combination of falling ICT enrolments in both the VET and tertiary sectors¹⁴ compounded by high drop-out amongst those that do enrol¹⁵. Further, the ACS believes there has been significant long term underinvestment by employers in upskilling and reskilling the existing workforce in relevant ICT competencies. The result is a growing reliance on skilled and temporary migration schemes as a key source of ICT worker supply.^{16,17}

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http://stat.abs.gov.au/itt/r.jsp?RegionSummary®ion=4&dataset=ABS_NRP9_ASGS&geoconcept=REGION&measure=MEASURE&datasetASGS=ABS_NRP9_ASGS&datasetLGA=ABS_NRP9_LGA®ionLGA=REGION®ionASGS=REGION

10 <http://www.cedefop.europa.eu/en/publications-and-resources/statistics-and-indicators/statistics-and-graphs/rising-stems>

11 http://www.esa.doc.gov/sites/default/files/reports/documents/stemfinaljuly14_1.pdf

12 <http://ec.europa.eu/digital-agenda/en/grand-coalition-digital-jobs>

13 AWPA, ICT Workforce Study July 2013, page 47

14 http://www.acs.org.au/__data/assets/pdf_file/0014/13541/2012_Statcompendium_final_web.pdf (pages 17 - 19)

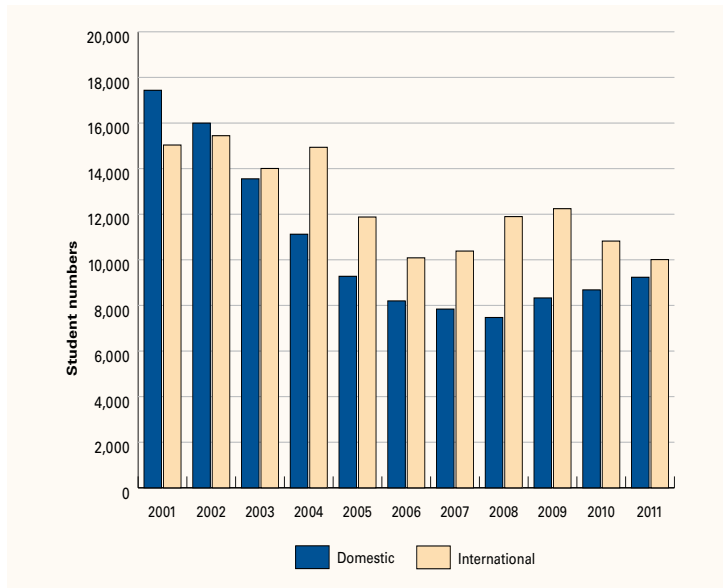
15 http://acs.org.au/__data/assets/pdf_file/0004/28570/Australian-ICT-Statistical-Compendium-2013.pdf (page 33)

16 http://www.acs.org.au/__data/assets/pdf_file/0014/13541/2012_Statcompendium_final_web.pdf (page 21)

17 http://acs.org.au/__data/assets/pdf_file/0004/28570/Australian-ICT-Statistical-Compendium-2013.pdf (page 37)

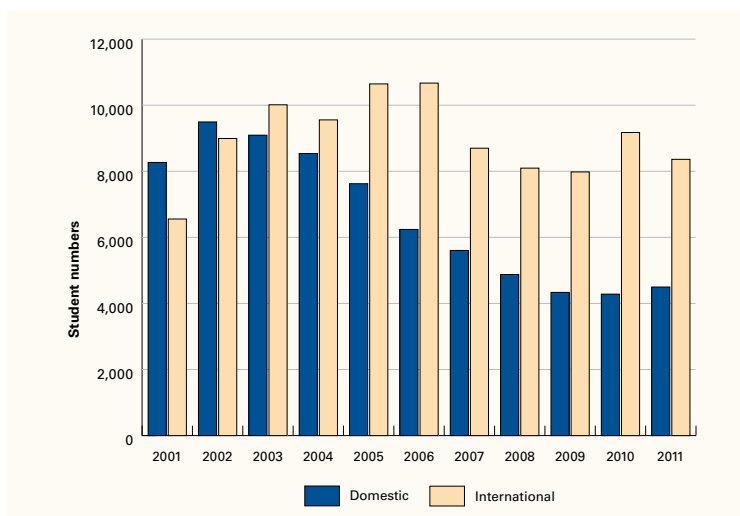
Charts 1 and 2 below, reproduced from the AWPA Report referred to above, clearly highlight the trend in Australia in terms of tertiary IT Commencements and Completions respectively. Chart 3 shows a similar trend in relation to VET commencements and completions.

Chart 1 – ICT Professionals – Higher Education Commencements in Information Technology, 2001 – 2011



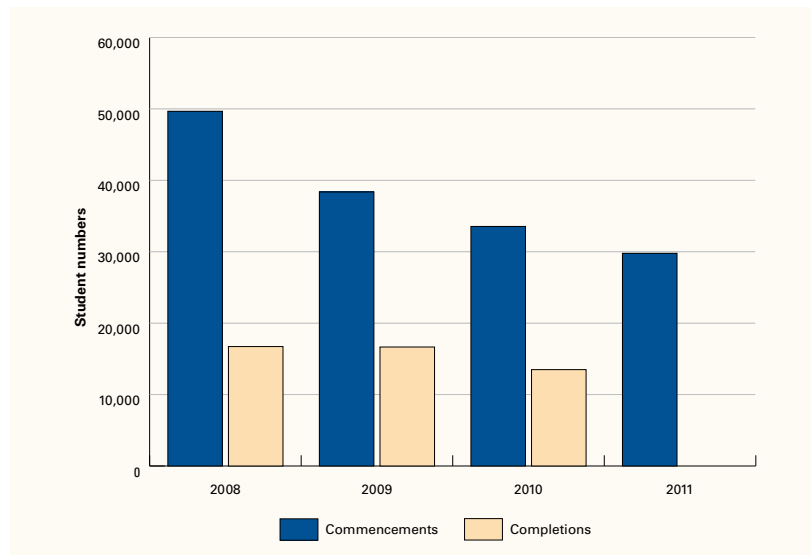
Source: DEEWR, *ICT Labour Market Indicators, February 2013*, www.skillsinfo.gov.au/sites/skillsinfo.gov.au/files/documents/ict_labour_market_february_2013_0.zip.

Chart 2 – ICT Professionals – Higher Education Completions in Information Technology, 2001 – 2011



Source: DEEWR, *ICT Labour Market Indicators, February 2013*, www.skillsinfo.gov.au/sites/skillsinfo.gov.au/files/documents/ict_labour_market_february_2013_0.zip.

Chart 3 – VET Commencements and Completions for ICT & Integrated Telecommunications qualifications 2008-2011



Source: National Centre for Vocational Education Research VOCSTATS, *Students and Courses*, accessed 12 June 2013.

The South Australian economy is not immune from these trends. It too faces the challenge of lifting the mix, number and level of ICT skills in its economy and making the appropriate investments now to guard against future shortages. It must do this against the backdrop of a globally connect world where the movement of labour is relatively free and more and more economies are chasing scarce ICT skilled resources. So there is no room for complacency.

5. ACS SUGGESTED RESPONSE

As the NBN rollout progresses and high speed broadband becomes more pervasive, a whole new online world opens up bringing with it enormous opportunities as well as some threats. To successfully capture the opportunities as well as effectively combat the threats, the ACS suggests South Australia needs to address the following issues as priorities:

1. The education and training system – in particular the extent to which it is producing the requisite number and quality of ICT skilled professionals and other digitally literate workers.
2. Workforce development planning – working strategically with employers and the education sector to ensure the State is planning for and investing in the workforce of the future.
3. Digital literacy of Small and Medium Enterprises (SMEs).
4. Driving innovation through stronger collaboration between industry, universities and other research organisations.
5. ICT Professionalism – putting in place systems and processes to ensure those working in critical areas of ICT practice and activity meet minimum standards of competence and ethics.
6. More effective engagement and collaboration between Government, the ICT industry, other industry groups and sectors, the ICT professional society, and the education sector.

5.1 The Education and Training System

The NBN at one level creates opportunities for new, more effective and more widespread delivery channels for education material. At another level it creates pressure on the education and training system to be agile and responsive and capable of producing graduates and workers who are suitably skilled for the fast moving digital world.

In relation to the former, we need only look at examples such as in the UK which turned a school with low attaining students into high attaining students simply by replacing pen and paper with Web 2.0 infrastructure¹⁸. Specific capabilities and opportunities opened up by NBN include things like:

- platforms to support diverse teaching and learning techniques (eg Massive Open Online Course - MOOCs)
- access to an increasingly rich pool of educational resources (eg video streaming, interactive teaching methods, specialist training options, customised educational and training programs)
- opportunities for students to learn at their own pace rather than the pace dictated by the institution
- providing educators with access to quality teaching tools and resources and professional development activities (eg via peer networks)
- fostering collaboration between tertiary and research institutions and employers
- the ability for educators to tailor and target education and teaching methods to disadvantaged localities/demographics/students

18 Williams, T. Connecting Communities. The impact of broadband on communities in the UK and its implications for Australia, commissioned by Huawei Australia, author, Dr Tim Williams, February. p.46

In Australia, where we are voracious consumers and users of technology (eg Australia’s take up of mobile and smart phones is amongst the strongest in the world) these benefits will in ACS’ view be delivered effectively without any particular need for Government lead intervention.

However the second impact noted above - pressure on the education and training system to be agile and responsive – is much harder and will certainly require action and initiative by Government in collaboration with the sector. The ACS suggests South Australia needs to consider initiatives at each of the three levels of the education pipeline.

5.1.1 Primary & Secondary School

With ICT being a fundamental driver of productivity growth and innovation, some basic level of proficiency in and understanding of ICT now sits alongside numeracy and literacy as a foundation skill for all students. Although using ICT as a learning tool is generally addressed in most school curricula today, our students need to move beyond knowing how to consume and use technology, and learn how to create and build new digital technology solutions.

The Business Council of Australia (BCA) noted the following in July of this year when discussing our education systems:

*“These systems need to produce skilled and capable people with the ability to manage their careers in a rapidly changing world and labour market. This entails a shift away from training for a particular job, to a system that equips people with the capabilities and skills required to compete in a technology-enriched, globally traded labour market, regardless of their qualification.”*¹⁹ In the same report, the BCA called for the introduction of *“computing coding as a compulsory subject as part of the national curriculum”*, calling it one of Australia’s *“immediate priorities.”*

The B20 Human Capital Taskforce issued a report in July 2014 calling on Governments of the G20 nations to *ensure “coverage of new skills in school curricula relevant to the digital age: particularly technology/digital literacy, problem solving, critical thinking, collaboration and inter-personal communications.”*²⁰ The Taskforce also highlighted the essential path to success in the education sector, including increasing the alignment and responsiveness between the learning ecosystem and the workforce needs by, amongst other things, *“aligning curricula with workforce and industry needs, utilising multiple learning pathways and models”* and *“building basic skills for the digital age.”*

In this context it is significant to note that the United Kingdom in September this year introduced computer coding as a mandatory subject in primary schools. In January this year, Michael Gove, former UK Secretary of State for Education, explained the initiative by observing that:

“ICT used to focus purely on computer literacy – teaching pupils, over and over again, how to word-process, how to work a spreadsheet, how to use programs already creaking into obsolescence; about as much use as teaching

¹⁹ Building Australia’ Comparative Advantage, Business Council of Australia, July 28 2014, page 18.

²⁰ <http://www.b20australia.info/Documents/B20%20Summit%20Documents/B20%20Human%20Capital%20Taskforce%20Report.pdf>

children to send a telex or travel in a zeppelin. Our new curriculum teaches children computer science, information technology and digital literacy: teaching them how to code, and how to create their own programs; not just how to work a computer, but how a computer works and how to make it work for you".²¹

ACS expects more countries will soon follow the UK example given the growing and widespread realisation globally that an adequate supply of ICT skills is a vital prerequisite for economic success and growing living standards. We need to make sure Australia and individual States and Territories are not laggards in this regard, but rather are at the front of the ICT wave. Jurisdictions which do so can create a competitive advantage vis a vis other States/Territories and nations.

Another example of early stage education in creativity and innovation foundation is Estonia, a country of only 1.29 million people, where publicly educated students are required to learn coding at ages 7-8 and continue to the final year of school.²²

The ACS therefore recommends that South Australia adopts as soon as practicable mandatory Digital Technologies curriculum for Foundation to Year 10. This curriculum has been developed over recent years by the Australian Curriculum Assessment and Reporting Authority (ACARA) in deep and close consultation with relevant stakeholders including State and Territory curriculum authorities, teachers associations, universities and leading educators, industry groups and ourselves as the ICT professional society. This curriculum is now gaining international attention as being world leading edge. It therefore presents South Australia with an opportunity to gain a competitive edge on many of its competitors.

The ACS has recently written to the South Australian Minister for Education, the Hon Jennifer Rankine MP on this issue.

5.1.2 The VET System

The South Australian Training and Skills Commission (TaSC) has done a good job over the last 6 years in providing independent advice to the Government on the VET system and how it can maximise its contribution to the South Australian economy. Its recent December 2014 report, which presents a five year workforce plan, is a realistic and well researched piece of work. It clearly recognises the challenges which currently face the South Australian economy and the role the VET system needs to play in helping put South Australia on a sustainable growth path.

"The creation of high-wage, high-skilled occupations stemming from the diversification of traditional industry sectors and emergence of the service economy will support future workforce productivity. This vision for South Australia will be achieved only by capitalising on the state's unique strengths and transforming its traditional manufacturing base."²³

²¹ <https://www.gov.uk/government/speeches/michael-gove-speaks-about-computing-and-education-technology>

²² www.innovatsioonikeskus.ee/en

²³ http://www.tasc.sa.gov.au/DesktopModules/Bring2mind/DMX/Download.aspx?Command=Core_Download&EntryId=567&PortalId=5&TabId=1047

“Education and training are fundamental to preparing the future workforce for the changing landscape and composition of South Australia’s labour market.”

The disruption to job roles, workforces and indeed entire industries brought about by the digital age means that vocational training has taken on a new urgency. The VET sector has far more students than the tertiary sector – approximately 4 million VET compared to 1.3 million for tertiary²⁴ - and is generally that part of the education system which does much of the “heavy lifting”, both in terms of providing pathways to employment for those leaving school and for equipping people to move from lower to higher value jobs or from one industry to another.

As TaSC highlights in its report, South Australia needs to ensure it has a VET system that helps build agility and flexibility into its workforce and is responsive to the needs of employers. The ACS itself has not traditionally had strong engagement with the VET sector, but we increasingly see a role for ourselves given the growing importance of ICT skills in a modern, successful economy. In particular, ACS can bring to the table considerable ICT course content; we can assist with the ongoing professional development of teachers in the system; and we have also developed a work-readiness program, elements of which could be incorporated into the VET system. The ACS Professional Year program runs for 44 or 52 weeks and aims to equip students with the professional skills needed to succeed in the Australian workforce. These include communication skills, business skills and workplace culture awareness, internships and online professional development courses. ACS would be very happy to work with South Australian VET institutions to configure and transfer components of his program to make then suitable for the State’s VET students.

In summary, ACS generally supports the recommendations TaSC has made in its December 2014 report. However, **ACS also recommends** the following in relation to the VET sector:

- all courses to include a strong focus on delivering base level ICT skills and competencies. This is particularly important in a fast changing, digitally driven world where a focus on ‘industrial age’ skills and qualifications may leave graduates “unqualified” and less able to adjust to the jobs of tomorrow; and
- ensuring graduates are genuinely job ready through having access to, and being taught, some of the softer skills such as project management, leadership, creativity, teamwork and effective communication.

5.1.3 The Tertiary Education Sector

The ACS has ongoing dialogue with individual employers and employer groups. The area of concern most consistently raised in relation to tertiary ICT graduates is that they are not considered to be work ready. This is generally a reference to deficiencies in the softer skills such as project management, effective communication skills, customer relationship and stakeholder management skills, teamwork capabilities and entrepreneurial thinking.

Addressing this concern goes to two closely related issues:

1. the suitability of tertiary course content, and

24 https://go8.edu.au/sites/default/files/docs/article/profile_of_australian_education_2012_final.pdf

2. the lack of focus and priority around work integrated learning (WIL). WIL is a term for approaches and strategies that integrate theory with the practice of work within a purposefully designed curriculum. It is typically done through industry internships and placements. The placements would be an accredited unit within the course of study. In many study disciplines (eg law, medicine, psychology, etc) it is a mandatory element of study and a pre-requisite for graduation. Not so in ICT. So integrating WIL into VET and tertiary ICT courses is aimed at improving the employability of ICT graduates by giving them valuable practical experience which is directly related to their study. Much of this “practical experience” is directed at addressing the softer skills issues highlighted earlier. WIL improves the transition from study to work and can considerably improve the productivity outcomes for the employer and the economy.

The ACS is playing an active role in addressing both of these issues.

In terms of course content, the ACS accredits university ICT courses, with the primary reference document for that accreditation being the Core Body of Knowledge (CBOK). There are currently 45 institutions nationally (primarily universities but also some TAFEs) whose ICT courses are based on the ACS CBOK. This puts the ACS in a strong position to exert some influence on the content and structure of ICT courses. To this end the ACS will, from early 2015, commence a review of its CBOK. A key element of the review will be a consultation process with industry and employers seeking their input on deficiencies and weaknesses in the current courses. The intent is to complete the review by mid-2015. As part of this review the ACS will work closely with employers in South Australia, including the Government itself as an employer.

In terms of addressing the WIL issue, at a national level the ACS is in dialogue with the large employer groups (BCA, AiG and ACCI) and Universities Australia who in January of this year collectively identified WIL as a significant issue and have embarked on a work program to address the issue. However the ACS urges South Australia to itself embark on initiatives to address this issue. To this end, the **ACS recommends** the Government establish a Forum which builds partnerships and collaboration between South Australian employers, the education sector (both tertiary and VET) and the ACS as the ICT professional body. The successful, rapidly transforming economies of the world are building deep relationships between universities and VET equivalents, industry and the relevant professional bodies. So too in South Australia, the Government needs to encourage and facilitate these alliances between its capacity-building education and professional institutions and employers. Future growth prospects will be shaped in large part by how well the State can develop a culture of understanding, trust, partnership and engagement on a scale that bolsters competitiveness.

In practical terms, ACS suggests the work program for this group focuses initially on:

- Establishing a profile and baseline of what WIL is happening now and what is working well;
- Promoting and disseminating best practice;
- Exploring ways for participants - employers, educators and students - to find and work with the right people;
- Providing financial support for research which helps develop the evidence base to improve WIL effectiveness and the outcomes for participants;

- Developing means for better informing students of opportunities through WIL.

5.2 Workforce Development Planning

Technology change, driven largely by ICT and the exponential growth in computing power is having a significant transforming impact on economies and job roles. Fundamentally, jobs are moving up the supply chain, meaning fewer low skill jobs and more demand for jobs requiring high technology and ICT related proficiencies.

McKinsey and Company estimates that in the US between 2001 and 2009, 4.8m high capability jobs were added, but 2.7m “production” jobs were lost and 0.7m “transactional” jobs lost²⁵. A 2013 study by Dr Carl Benedikt Frey and Dr Michael Osborne at the University of Oxford examined 702 professions in the United States and found that 47 per cent were at risk of being replaced with computerized systems²⁶. And a 2012 report by Cedefop found that Science, Technology, Engineering and Mathematics (STEM) occupations in Europe are expected to grow by 14% by 2020 compared to 3% for other occupations.²⁷

This trend creates significant challenges on multiple fronts. Educators are trying to understand the job roles they should be seeking to prepare future graduates for. Employers want to know future workforce requirements so they can develop appropriate recruitment and training programs. Students are trying to decide what career provides them with the best employment prospects. And for existing workers, they are now confronted by the reality that entire industries and career pathways are being digitally disrupted. Jobs for life really don’t exist anymore and lifelong learning is now almost mandatory.

For South Australia, an economy struggling with sluggish economic growth and seeking to capitalise on the new growth opportunities presented by the digital world, having an agile, skilled, technically literate and flexible workforce will be critical. To achieve this will require all stakeholder groups to work collaboratively and strategically to develop a plan to effectively deal with the new world order. This plan needs to be underpinned by thorough, evidence based research.

The **ACS recommends** research is commissioned which seeks to identify the skills and qualifications the South Australian economy is likely to need in the next 5-10 years. The project, to be undertaken as a joint initiative of Government, industry, the education sector, community groups and relevant professional societies, would involve three key elements:

1. Identifying plausible trends and scenarios for employment in the State in light of accelerating advancement of digital technologies;
2. Identifying the types of jobs at risk, the types of jobs likely to become more important, what new jobs will be created, and impacts on demographics in the State; and
3. Identifying and proposing transition pathways for industry, government and community sectors to achieve

25 <http://www.bca.com.au/publications/building-australias-comparative-advantages>

26 <http://www.futuretech.ox.ac.uk/news-release-oxford-martin-school-study-shows-nearly-half-us-jobs-could-be-risk-computerisation>

27 <http://www.womenandtechnology.eu/digitalcity/servlet/PublishedFileServlet/AAAIYRG/STEMskills-Europe-2013.pdf>

better outcomes.

Whilst this project will help South Australia with its long term workforce planning, other initiatives also need to be taken to address the shorter term, “here and now” issues.

The ACS has in the last 12 months witnessed a growing urgency around workforce development planning across both public and private sector organisations, with a particular focus on ICT workforce planning. The ACS itself has a workforce development tool called mySFIA, (www.acs.org.au/sfia-certification/mysfia) which is based on the globally recognised Skills Framework for the Information Age (SFIA). SFIA was established in July 2003 and is a system for IT Professionals to match the skills of the workforce to the requirements of the business. It is a logical two-dimensional skills framework defined by areas of work on one axis and levels of responsibility on the other. It has been proven as an effective resource that benefits both individuals and businesses by facilitating all aspects of the management of ICT capability. In essence, mySFIA allows organisations to map the existing ICT skill set of their workforce, identify the skills gaps, and then use this analysis to plan their training and recruitment programs. Using this tool ACS is now working with a range of organisations, including some top 10 ASX companies, to assist them with their ICT workforce planning. Other similar tools are also available in the market.

The **ACS recommends** the South Australian Government:

- Consider adopting mySFIA or some similar tool for ICT workforce planning within its Government agencies
- Implement a program which promotes mySFIA and similar tools to businesses in South Australia and, within certain eligibility criteria, provide some level of subsidy for those wanting to utilise the tool.

5.3 Digital Literacy of Small and Medium Enterprises (SMEs)

SMEs typically comprise the vast majority of businesses in an economy and South Australia is no different. Based on 2011 Census data, the ABS reports that there were almost 126,000 businesses in South Australia employing 4 or less people²⁸. That represents 85 percent of all businesses in South Australia. So to drive higher growth in an economy it is critical that Governments create an environment where small businesses can thrive. And in today’s digital world that means they must have certain minimum levels of digital competence and literacy.

However the findings of a PayPal Research project in 2013 on small business digital literacy are worrying²⁹. Whilst they are not specific to South Australia, the findings in our view will nevertheless be typical of small businesses in South Australia.

Key findings from the survey were as follows:

28

http://stat.abs.gov.au/itt/r.jsp?RegionSummary®ion=4&dataset=ABS_NRP9_ASGS&geoconcept=REGION&measure=MEASURE&datasetASGS=ABS_NRP9_ASGS&datasetLGA=ABS_NRP9_LGA®ionLGA=REGION®ionASGS=REGION

29 https://www.paypal-media.com/assets/pdf/fact_sheet/PayPalResearch_DigitalLiteracyAmongSMBsinAustralia.pdf

1. 3 in 5 SMEs claim low levels of digital literacy are preventing them from running their business more efficiently.
2. Only half have tried to improve their digital literacy.
3. 4 in 5 SMEs claim there should be more help and guidance to help them embrace the digital economy.
4. Among Australian SMEs that have tried to improve their digital literacy, the most common methods are through independent learning tool such as online search (65%) and online tutorials (49%).
5. Australian SMEs claim the most effective method to increase their own levels of digital literacy would be a fully funded training course, followed by access to a website with small business advice.
6. Only 34 percent list their contact details online, despite this being increasing the method most Australians find information
7. Only 1 in 5 advertise online, less than 1 in 10 use cloud based software solutions for their business, and only 26 percent use the internet to sell

The key take-out message from these findings is that SMEs are saying we know we can have more successful businesses if we get digitally smarter, but we need assistance and guidance to help us get there.

The ACS believes it can play an important and value adding role in this regard. We have an abundance of relevant ICT training material and courses, we have passionate, successful ICT practitioners in our membership, we are vendor neutral, and we have industry partners who have deep knowledge of the small business sector, and in particular, their ICT strengths and weaknesses. Our view is that to effectively address the ICT literacy issues of SMEs, it is important to move beyond the usual education and awareness type campaigns and strategies which Governments have typically pursued.

Instead, we **recommend** a program be developed which includes the following key elements:

1. working with individual businesses to benchmark their digital literacy and identify their specific areas of weakness
2. based on (1) above, help broker for them relationships with relevant “best in breed” ICT suppliers
3. the program be delivered on a regional basis and involve collaboration between State Government, ACS, and SME diagnostic specialists working with local stakeholders such as local governments, chambers of commerce and industry sectoral bodies.
4. The program to be initially seed funded by Government, but with ownership and funding arrangements transitioned over time to the local stakeholder community.

We see elements 3 and 4 above being particularly important. For a program such as this to be successful, it is critical that local stakeholders take some “ownership” of it rather than just being a passive recipient of Government funded assistance. “Ownership” puts accountability into the system which in turn helps ensure outcomes will more likely be achieved and, importantly, will more genuinely match the needs of the individual SMEs.

5.4 Collaboration between Industry, Universities & Other Research Organisations

In its aspiration that South Australia becomes “The Knowledge State”, the Government noted the following in its 5 December 2014 statement:

“We must improve support for applied research and innovation as part of a vibrant entrepreneurial ecosystem that connects knowledge and research to commercial opportunities that will grow jobs and diversify South Australia’s economy. This will require better collaboration between industry and our universities and research institutes.”

This concept of collaboration between industry and research bodies being a driver of innovation and economic growth is not new. But Australia has a poor record in this regard and is consistently a laggard in international comparisons. The Chief Scientist’s September 2014 Report “Science, Technology, Engineering and Mathematics: Australia’s Future”³⁰, noted that:

“Analyses from the OECD and the Australian Bureau of Statistics (ABS) using 2010-11 data highlight Australia’s poor record in business to research collaboration. Using OECD analysis of innovation active businesses, out of a total of 33 countries, Australia ranks 32nd on business to research collaboration for small to medium enterprises (SMEs), and 33rd for large firms. Similar analysis by the ABS for all OECD countries, but including businesses with 0-9 employees, improves our position to 15th for SMEs and 21st for large firms. Only 13.7 per cent of our large firms collaborated with research organisations: slightly above the level of collaboration—9.6 per cent—by our SMEs”.

He went on to add:

We have a culture of risk aversion and inward focus. Less than one in two Australian firms identify themselves as innovators. Just 1.5 per cent of Australian firms developed new to the world innovations in 2011, compared with 10 to 40 per cent in other OECD countries. More than 60 per cent of Australian firms kept innovations within the company.

We are still building recognition and respect for researchers working in business. Less than one in three (30 per cent) Australian researchers work in industry, which is half the OECD average and less than the US, where two in three researchers are in the business sector.

So Australia is a chronic underperformer in collaborative research. But the silver lining in this cloud is that there is a significant upside and potential benefits to be reaped if an individual State or Territory or indeed the nation can move at least some way down the collaboration path. The statements by the South Australian Government are a clear indicator of intent. The key is to back up the rhetoric with appropriate execution and action.

The ACS believes it can play a useful role in assisting achieve greater collaborative research outcomes in South Australia. This could be either through membership of the Premier’s Science and Industry Council, or simply by ongoing and active engagement with the key stakeholder groups.

30 http://www.chiefscientist.gov.au/wp-content/uploads/STEM_AustraliasFuture_Sept2014_Web.pdf

The particular value that the ACS believes it can bring to this issue include the following:

- Amongst our 23,000 members nationally and almost 1000 members in South Australia, we have some of Australia's foremost and well respected ICT and other technically based professionals.
- We have existing relationships with all of the Universities through our role as the accreditor of ICT degrees. A large number of our members and elected officials are also senior employees at various universities.
- We have strong and growing links into industry and corporates, and in particular with CIOs and CTOs.
- We have international linkages and networks with both Government and private sector groups, particularly in Europe and Asia.
- We host over 600 events nationally each year which gives us a powerful channel for generating dialogue and collaboration amongst the stakeholder groups.

5.5 ICT Professionalism

This issue relates to the quality of ICT skills, rather than just the quantity. In a world where ICT is a core component of productivity growth, competitiveness and innovation, and where ICT sits at the heart of so many products and services, we need to be sure that those building the ICT elements of our products and services are suitably qualified and operate in a professional and ethical manner.

"The most important reason to examine and build ICT professionalism stems from the extent to which the increasing pervasiveness of ICT has the potential to harm our economy and society. The extent to which ICT is embedded in our lives is inevitably growing. If we fail to take steps to mature the ICT profession, it is likely that the risks to society from ICT will grow to unacceptable levels."³¹

We would not let a doctor operate on us who was not suitably qualified and accredited by a professional body. We would not be represented in court by a lawyer who was not suitably qualified and accredited. The same principle must start to apply for workers in certain areas of ICT. We need to ensure that those building ICT systems that are, for example, critical to the effective operation of our health and education products and systems, our modes of transport, our social services, or our ability to engage and transact with governments and private sector organisations are suitably qualified and accredited. Substandard, inferior ICT work can result in significant financial, brand and reputation damage and in some cases can have catastrophic outcomes.

A recent reminder of this issue in South Australia is the findings by the Auditor-General that that \$90 million of cost overruns are occurring across the Government's four worst-performing IT projects³². The Auditor-General projected that situation would get worse before it gets better.

³¹ <http://ipthree.org>

³² http://www.itnews.com.au/News/398597.south-australian-it-projects-run-90m-over-budget.aspx?eid=3&edate=20141208&utm_source=20141208_PM&utm_medium=newsletter&utm_campaign=daily_newsletter

There is now globally a growing recognition of the importance of this issue and the need to address it. However it is a longer term issue and the response must be driven by collaboration between Governments, the profession, the industry and user groups. Nevertheless in the short term there are things that individual governments can do to take us some way along this path.

The **ACS recommends** that the South Australian Government work with the ACS and employer and standards setting bodies on establishing, as a first step, a system for ensuring that senior ICT roles in Government agencies can only be filled by people who meet agreed accreditation standards which ensure minimum levels of competency and appropriate standards of professional and ethical conduct. Depending on the results and feedback, it may be that the accreditation framework can then be extended to private sector employers as well.

5.6 Improved Public & Private Sector Engagement

ACS believes it is good public policy practice for Governments, in developing policy and program settings, to engage and work collaboratively with those stakeholder groups with the relevant expertise, experience and insights in the subject matter area concerned. To this end, **ACS recommends** the South Australian Government establish a Digital Policy Advisory Council, comprising members from the ICT industry, broader employer groups, the education sector, the community sector and the ACS as the professional society for ICT.

To ensure it works in a complementary way to, and does not duplicate the work of, the Premier’s Science and Industry Council, the remit of the Council should be to provide advice on the digital readiness of the South Australian economy and make recommendations to Government to help ensure South Australia takes full advantage of the opportunities presented by digital technologies. As part of this remit, it is particularly important that the Council not just focus on the ICT industry alone. Whilst a vibrant and growing ICT industry is an important contributor to a successful economy, it is critical that the Council look across all industry and community sectors and assist them to be digitally ready and acquire the ICT skills and capabilities they need to be more efficient, innovative and competitive.

6. OTHER MATTERS

In relation to ToR Number 4 of the Inquiry – “any other relevant matter” – the ACS notes that the combination of ubiquitous high speed broadband coupled with smart, dynamic applications, tools and service models offers opportunities in a number of other areas across the economy. Whilst we don’t intend to comment in depth on these in this submission, we do feel they are worth at least highlighting because they each in their own right offer potential economic benefits and growth opportunities for South Australia.

6.1 Delivery of Government Services

In a high speed, connected online world, Governments can significantly improve their own efficiency and effectiveness. In particular through:

- advanced data and analytic capabilities which deliver more ‘intelligent’ services that are better aligned with Government policy objective. Government commitment to an open data agenda is a key element in this

regard.

- convergent technologies that deliver services more effectively and more efficiently, including the ability to converge service delivery across the various layers and functions of Government
- increased user/consumer participation and engagement with Government which improves the relationship between citizens and Government, and in particular enable citizens to actively participate in debates and discussions on public policy issues.
- technologies that support new business and service delivery models (eg through cloud computing) which deliver budget savings.

According to the European Commission's 9th e-Government benchmarking report³³, the average availability of online public services in the European Union went up from 69 percent in 2009 to 82 percent in 2010. The report notes that making more government services available online helps cut public administration costs significantly. One area in particular highlighted in the report is the savings available through moving to eProcurement (see page 71 of the report). To quote from the report:

“eProcurement as a major driver for more efficient government. Efficiency benefits derive from two main interlinked effects: operational savings thanks to the streamlining and greater productivity of the digitization of the procurement process and price reductions of purchased goods and services, thanks to increased competition and greater transparency in the bidding process.”

The report goes in to identify quantifiable benefits by certain countries:

- *eProcurement Scotland, launched by the Scottish government as a “catalyst for strategic change” of the procurement process, reports audited savings of almost £800 million over a 4-year period.*
- *Sweden has reported a reduction on prices between 10% and 30% as well as efficiency improvements in the procurement process of 20% going up to 30% when the entire tender is processed online.*
- *The Austrian Federal Procurement Agency provides eProcurement services for federal authorities purchases. In 2008 it reported savings of €180 million against a procurement volume of €830 million.*

6.2 Environmental Benefits

The combination of high speed, ubiquitous broadband and smart use of ICT presents opportunities to reduce the carbon footprint. Very briefly these include, for example:

- Increased efficiency in power distribution and consumption
- Teleworking and online services
- More efficient public and personal transport systems.
- Ability to deliver health and education services remotely.

³³ https://ec.europa.eu/digital-agenda/sites/digital-agenda/files/egov_report.pdf

6.3 More Business Opportunities

Whilst high-speed broadband and digital technologies are great disruptors of industries, they also create new opportunities, for example:

- lowering telecommunication and transaction costs
- lowering ICT infrastructure costs by leveraging shared services and platforms such as cloud computing
- increasing efficiencies and productivity through automation, workflow management systems that manage risk and dynamically report the health of the business, improved information flows and communication
- creating opportunities for regional businesses to tap in to global markets
- enhanced ability to attract investment from anywhere around the world
- increasing opportunities for business innovation

6.4 Social, Community & Regional Benefits

Whilst the online world is often portrayed as contributing to the decay of regions and communities because it promotes remote access to goods and services and reduces the need for face-to-face interactions, it does in other ways generate benefits. For example:

- it can reduce social isolation via online communities and through that, increase social cohesion and engagement
- it allows broader based community activism and advocacy
- it can create and strengthen communities of interest
- it creates more opportunities for skill development and wider access to jobs
- It can increase access to a range of health, education, social services etc.