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Submission to the Inquiry into the role and potential of the National Broadband Network

In 2009 the Government established a series of Industry Innovation Councils to bring together innovation leaders from industry, unions, research and government to strengthen the culture of innovation in Australia. The Councils provide strategic advice to Senator the Hon Kim Carr on innovation priorities; they champion innovation in industry, and build connections and collaborate across Councils and with other innovation organisations.

I chair the Information Technology Industry Innovation Council (The Council) and in that capacity I am presenting the following submission on the significance ubiquitous high speed, high capacity telecommunications, such as that delivered by the National Broadband Network (NBN), has to Australia's future. Indeed, the NBN provides the platform and catalyst to fundamentally rethink how we all live, work and play.

While the Council provides advice to government on improving the environment for the innovative development of new technologies of value and the innovative application of existing technologies to create competitive advantage, we see innovation not as an end in itself but as part of a continuum within a context that, unfortunately, appears not to be well understood.

The Council's view is that the context is the increasingly **global digital economy** - an economic system that operates globally with economic agents that participate in the production, distribution and consumption of goods and services facilitated by digital applications and information operating across high-speed, high capacity, ubiquitous, digital infrastructure.

And the Council sees the continuum (Figure 1) that exists within this digital economy context ends with our nation continually improving its global **economic performance**. We see that by doing so, our citizens will enjoy sustained levels of personal and national prosperity into the future. Conversely we see that if we do not generate ever increasing prosperity, our ability to provide services to and ensure a positive future for our citizens will be increasingly limited.

In order to achieve this objective, our industries must continually improve their global **competitiveness** and our governments must be global leaders in cost effective service delivery. And the key to global competitiveness and service delivery leadership is **productivity**, individually and as a nation.

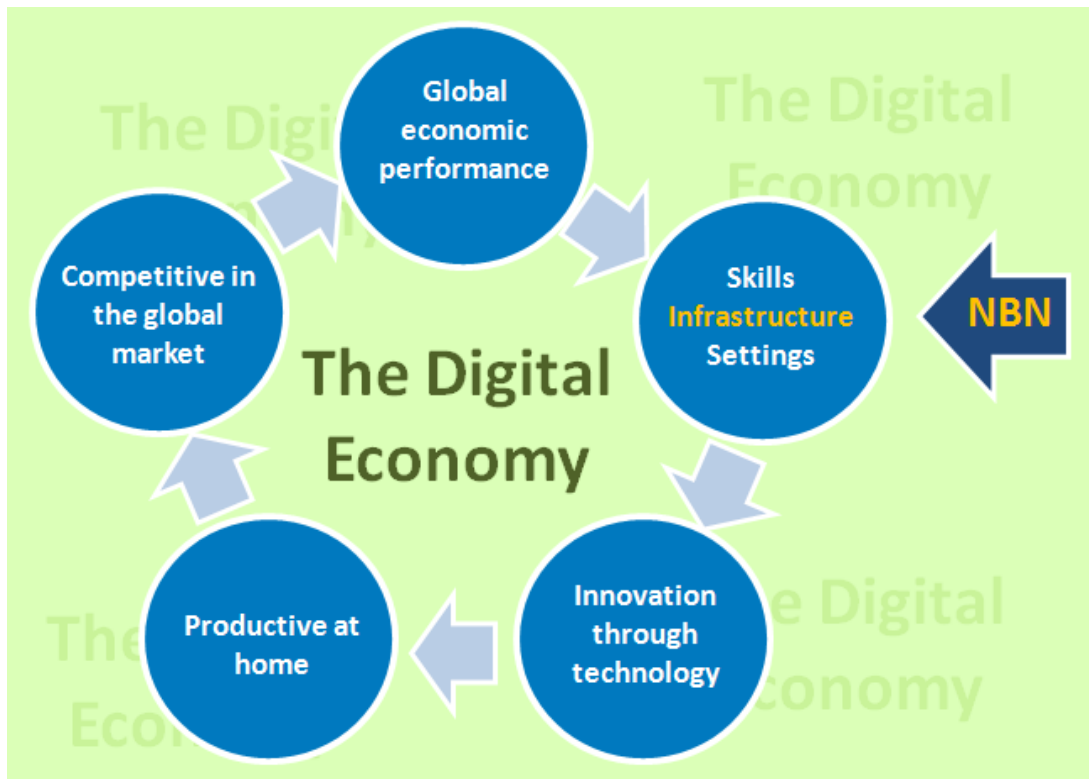
Fuelling productivity is **innovation** in the development or adoption of new or improved products, services, processes, organisational practices and marketing methods, much of which is dependent on digital applications and information.

And underpinning innovation is a foundation framed by the development and application of the appropriate **skills**, the appropriate legislative, policy and incentive **settings** and the **infrastructure** of the digital economy - ubiquitous, high speed, high capacity, broadband communications.

And the continuum closes with global economic leadership generating the wealth that allows us to continue to invest in the foundation skills, policy settings and infrastructure.

Short selling the foundation elements of skills, settings or infrastructure will compromise our desired outcome. The fibre to the home NBN infrastructure gives optimum ubiquity, speed and capacity and will provide the opportunity for all other elements of the continuum to be similarly optimised. The Council asks why accept less when the stakes are so high?

Figure 1: The Context and the Continuum



Within this context, the Council has defined ubiquitous, high speed, high capacity broadband as the NBN and proposes that it will contribute significantly to:

a) the delivery of government services and programs:

Within the continuum, the effective and efficient delivery of government services is a key element. Increasingly government services and programs will be delivered from (government) data centres over the internet. The increasing data intensity associated with this form of delivery and wide scale adoption by citizens and business demands the NBN. In addition to this more traditional delivery model, emerging new models such as Cloud computing have the potential to dramatically change the way governments at all levels deliver programs and services to the Australian people. Cloud computing provides scalable and elastic applications and technology “as a service” over the internet to users from data centres across the world. The NBN is the infrastructure required for wide scale adoption of Cloud computing.

Compared to current service delivery models, delivery over the internet or via the Cloud can give substantial benefits including reducing costs, improving responsiveness, increasing productivity of government personnel, automating processes and providing access anywhere anytime all of which contribute to cost effective service delivery.

In relation to Cloud delivery of services, the Australian Information Industry Association (AIIA) has noted that “the funding models in the Cloud can flatten the investment cycle for Government by transitioning the need for irregular capital expenditure into more consistent operating expenditure”. It cites the UK Government’s estimate that moving into the Cloud could shave some £3.2 billion from the £16 billion annual IT budget.¹ There is no reason why similar relative savings could not also be realised by the Australian government with the NBN in place.

¹ Cloud Computing Strategic Direction Paper: Opportunities and applicability for use by the Australian Government, Draft for Consultation - AIIA Response, 4 February 2011.

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The NBN also has the potential to provide more targeted government responsiveness, with enhanced risk management due to the ability to access real time data and information. This could also allow for greater coordination across all levels of government including for example in a disaster response situation.

A second consideration in government service delivery is distribution of content. Technologists have been talking a lot about content streams or streams of information. *The metaphor implied by "streams" is powerful. The idea is that we are living inside the stream: adding to it, consuming it, redirecting it...It's also about restructuring the ways in which information flows in modern society. Those who are most enamoured with social media services like Twitter talk passionately about feeling as though they are living and breathing with the world around them...adding content to the stream and grabbing content when appropriate. But this state is delicate, plagued by information overload and weighed down by frustrating tools.*² The NBN can significantly enhance the quality and quantity of the content available in the stream. Current broadband capacity and speed have significantly impacted the content available to the general community as many development tools have been designed to our current low technology standards to ensure access to a wide audience. The NBN will remove this development limitation and allow new tools that fully utilise the available bandwidth to generate applications with significantly more content of significantly better quality. This can drive user adoption of the technology via the rich, high speed user experience which in turn can be very influential in ensuring wide scale uptake of online government services.

b) achieving health outcomes;

A healthy workforce is a productive workforce, and the NBN, through tele-health, has a huge role to play in delivering improved health outcomes to all Australians particularly those in regional, rural and remote areas. *Tele-health* includes the application of IT and tele-communications for diagnosis and treatment, education and support and the organisation and management of health information and decision support systems. While acknowledging the difficulties in measuring the benefits, in May 2010 Access Economics estimated *"that steady state benefits to Australia from wide scale implementation of tele-health may be in the vicinity of \$2 billion to \$4 billion dollars per annum"*.³

Importantly the benefits of telehealth extend beyond the direct cost to the health system. Access Economics has found that *"to the extent that telehealth will allow diseases to be detected and treated earlier [it] will reap productivity benefits to the whole economy through reduced absenteeism, presenteeism and welfare dependence"*.⁴ The resultant increase in productivity will enhance our competitiveness and ultimately, through the continuum, drive economic growth in the global market.

Aside from the direct benefits in healthcare delivery, and the indirect benefits to productivity and economic growth, Australia's local IT industry will also benefit through the opportunity to play a role in developing the software to facilitate tele-health and other e-health applications.

c) improving the educational resources and training available for teachers and students;

As stated in the introduction to this submission, skills are a critical element in the continuum to world leading economic performance. There are a range of skill shortages across the economy, including in the ICT sector with a shortage of *more than 2800 computing professionals across Australia*.⁵ Infrastructure such as the NBN has the capacity to address these skills shortages through new delivery mechanisms for teaching and learning which can assist Australia in repositioning our skills capabilities in a globally competitive context.

The Council has discussed and agreed on a suggested Framework for ICT Professionalism, as developed by the Australian Computer Society (ACS) and Australian Council of Deans of ICT (ACDICT) that will help build organisational capability and skills required to drive innovation, especially in the context of the NBN. This Framework for Professionalism should be revisited by the Standing Committee to evaluate its relevancy.⁶

² boyd, danah. 2009. "Streams of Content, Limited Attention: The Flow of Information through Social Media." *Web2.0 Expo*. New York, NY: November 17.

³ Financial and externality impacts of high-speed broadband for telehealth: Access Economics, July 2010 pp.2

⁴ Financial and externality impacts of high-speed broadband for telehealth: Access Economics, July 2010 pp.20

⁵ Voice and Data, Nov 2010, (General News Section) p.9

⁶ <http://www.innovation.gov.au/Industry/InformationandCommunicationsTechnologies/ITIC/Documents/ITICUpdateforStakeholders.pdf>

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Education is the foundation for developing improved skills and capabilities, and technology has for some time been a vital component in both the development and delivery of education from primary through secondary, tertiary, VET and so on. The last decade has seen considerable growth in the use of the internet in class-rooms and by students at home, through a range of IT platforms. Students are also utilising mobile technology such as PDAs, Pads and notebooks which provide easy access to digital content and allow flexibility in learning and teaching methods. The NBN will complement the existing use of these tools by providing the capacity to connect Australian schools, universities and TAFE colleges and students at home to each other and to the world, which will provide more interactive and effective learning opportunities for students, no matter where they live⁷. This may lead to the development of pools of potential skilled workers in new locations. Through the online delivery of education, students could choose to no longer travel to undertake training or education, as the virtual classroom can come to them.

As such, the education sector will continue to be strong users of digital technologies and this trend will provide the Australian IT industry with opportunities to develop specific tool sets focusing upon education content development and distribution. Australia has many commercial companies servicing this sector as well as Government support through The Learning Federation projects. The Learning Federation, (www.thelearningfederation.edu.au) is a project of *Education Services Australia*, which manages the national resource collection and infrastructure of digital curriculum resources. These resources are aligned with the curriculums of the Australian states and territories and will be aligned with the National Curriculum as it develops. Since 2001, these digital resources have encouraged and supported schools to embrace 21st-century education and to implement the Digital Education Revolution. The Council believes the NBN is critical to allowing organisations such as The Learning Federation to continue to innovate in the delivery of digital resources for our schools and students so that they have the opportunity to be ranked with the best globally.

Internet technologies are also fundamentally dismantling and reworking the distribution of education content. Mr Bob Cupitt, former CEO of the *Learning Edge International* and a member of the Council believes that distribution is a process by which content creators find channels through which they can disseminate their content. The *Learning Edge International* is a good example of a company created to service a need in delivering digital content linked to curriculum or course standards within the education market. The company is a software solutions provider to the education market and developer of the EQUELLA® digital repository software. The company has grown from a small Tasmanian operation to an international organisation exporting into North America, the United Kingdom and Europe and was recently purchased by a large international company. As successful as *The Learning Edge* has been, limitations imposed by current broadband capacity have inhibited technical development, particularly in incorporating large content items such as videos and digital images. To overcome this limitation, work-around solutions have been deployed but the richness and depth of the software has been compromised and its competitiveness reduced. The NBN will allow e-education companies such as *The Learning Edge* to drive innovation to its fullest potential and provide tools and resources that will be the equal of any in the world.

d) the management of Australia's built and natural resources and environmental sustainability;

The NBN will have the capacity to handle large volumes of data in real-time which will be vital as we move toward the implementation of smart infrastructure. Smart infrastructure in transport, water and energy will have embedded sensors that can transmit data allowing performance to be monitored and analysed in real time. Consequently, decisions that can optimise performance of the infrastructure eliminating waste and reducing capital investment can be made in real time. Implementation of these systems of the scale necessary for them to be effective will be significantly enhanced by the NBN.

Industry Example: The Built Environment

The Built Environment Industry Innovation (BELL) Council has as one of its key priorities the development and application of innovative tools and technologies. Principal amongst these is the technique of Building Information Modelling (BIM), which is the process of generating and managing building data during its life cycle. BIM uses three-dimensional, real-time, dynamic building modelling software to increase productivity in building design and construction.

⁷ <http://www.nbn.gov.au/content/who-does-nbn-benefit>

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According to the BEII Council, increasing use of IT, facilitated by the NBN, will have a profound effect on the way the Built Environment is planned, designed, procured, constructed and operated:

- Plans and designs can be conceived, tested and optimised in a virtual world before committing to construction. Such plans and design will benefit from access to data about usage consumption and performance of the existing built environment.
- Construction will tend towards a manufacturing process using “just in time” procurement allied to “mass customisation” and on-site assembly with all information flowing directly from digital databases and/or information rich models (Built Environment Models – BEM).
- Assets can be managed and efficiently operated directly from BEM, reducing energy consumption, optimising operating costs and determining replacement plans.
- Some systems (transport, electricity grids, water supply for example) can be optimised in real time using sensors, networks and computers.
- People will improve their usage of systems if provided with real time, pertinent information via communications networks (urban informatics, smart meters).
- All usage, consumption and performance of systems and assets, including relevant human behaviour, can be recorded; used for physical optimisation and reconfiguration; and fed back into the planning and design of the future built environment.

A recent report commissioned by the BEII Council and industry partners, *Productivity in the Buildings Network: Assessing the Impacts of Building Information Models*, found that accelerated uptake of BIM would provide significant productivity benefits to Australia, inducing a 0.05% boost to GDP by 2025.

e) impacting regional economic growth and employment opportunities;

The ubiquity of the NBN, with 93% of Australians having fibre to the home and the remainder a combination of wireless or satellite, will ensure the opportunities to participate in the digital economy and to create wealth are available to all Australians independent of location. Keeping people and businesses in our regions is critical both for the regions themselves but also for our crowded and congested cities.

Evidence from the experience of users in the United Kingdom is that “...broadband users are finding a wealth of positive effects across rural and remote communities, public services, the environment, aged care, community engagement and even democracy itself”.⁸ According to a recent report commissioned by Huawei, the telecommunications company working to roll-out superfast broadband services in the UK, the benefits of broadband to rural and regional communities in the UK is beginning to become apparent in a range of areas, for example:

- *In health*: telehealth is saving lives now in remote communities in Scotland
- *In the care of the elderly*: tele-care is now enabling 1.7 million to stay in their communities, lead independent and sociable lives, making huge savings – and strengthening family cohesion
- *In the environment*: tele-conferencing and related home-working are already reducing emissions and congestion – and supporting greater community involvement
- *In education*: results improved by two grades and hard to reach kids got switched on – especially if they had access to devices at home and school. Education is being transformed
- *Older, disabled, the isolated*: all report improved well-being from tele-care and greater connectivity, speaking to long-lost friends and family on Skype, getting involved in communities online
- *Public service efficiencies*: the digitisation of X-rays is saving money and lives; in Wales 22 local authorities and all public services are sharing one network, saving millions and improving quality; NHC Choices (a Face-book for health advice) got 20 million hits in the severe 2010 winter, saving the NHS £44 million.⁹

There is every reason to expect that with similar uptake of broadband in Australia, similar benefits can be realised. Specifically, the NBN has the potential to increase regional economic growth and employment opportunities through increased use of teleworking. Teleworking refers to “utilising information and communications technologies (ICT) to free staff from traditional office locations and enable them to work elsewhere”¹⁰.

⁸ White Paper, Connecting Communities, commissioned by Huawei Australia, author, Dr Tim Williams, February 2011, <http://www.huawei.com.au/assets/downloads/PDF/MEDIA%20RELEASE%20Connecting%20Communities.pdf>

⁹ as above

¹⁰ Sensis ‘Business Index Teleworking’ Report, July 2009, p.iii

Access Economics claims that the NBN will facilitate the growth of teleworking in Australia given that only six per cent of workers in Australia reported having any teleworking arrangements with their employer in 2006¹¹. Access Economics predicts that if 10 per cent of Australian employees were to telework 50 per cent of the time, the total annual gains from teleworking are in the order of \$1.4-\$1.9 billion per year¹².

Access Economics claims that employment opportunities could be increased by enabling employers to recruit the best employee regardless of where they are located¹². In a Macquarie Telecom survey of 540 firms from 17 industry groups, Access Economics found that approximately 20 per cent of respondents believed that the NBN would change their employment model; the majority observed that this would be through increased flexibility in the location of staff (e.g. through teleworking and regional centres) and expanding the supply of skilled labour available¹³.

f) impacting business efficiencies and revenues, particularly for small and medium business, and Australia's export market;

The continuum of innovation, productivity and global competitiveness in the digital economy applies particularly to our businesses large and small. They generate the revenues that provide jobs for Australians and pay the taxes that maintain services to citizens. To continually grow their revenues and hence employment and tax revenue, demands that they be increasingly competitive on the global stage. Australia's poor ranking of 15th in the 2009/10 Global Competitiveness Index suggests that we are not yet succeeding, however the introduction of vital infrastructure such as the NBN will serve as a foundation for increased global participation and competitiveness by Australian businesses, particularly SME's. Indeed the NBN will level the playing field allowing SME's an extended reach into global supply chains and increased export opportunities.

Dr Ian Oppermann, Director of the CSIRO's ICT Centre, likens the Governments investment in a national broadband infrastructure to the roll out of electricity to Australians in the 19th Century¹⁴. When this occurred the business case was to power electric lighting in homes and businesses thus making living and working conditions better and safer and helping people to become more productive. At that time, no-one could conceive of the breadth of use of electric power as evidenced by the number of electric appliances the average home now relies on. The potential of the NBN for individuals and for business is just as great.¹⁵

Dr Oppermann goes on to say that a national broadband infrastructure will offer greater coverage to all Australians and more consistent high speed and capacity and that it is these two things that will provide the platform for the greatest change.¹⁶ As it stands, inconsistent connectivity, particularly across rural and regional areas limits the ability for many Australians to engage in the digital economy. The coverage of the proposed system will lower those barriers for all Australians.

Ian Birks, CEO of the AIIA notes that, "...High speed internet access has the potential to change the way Australians engage with each other and will give us a competitive edge in the global economy."¹⁷ and that "...the major financial returns to Australia [from the NBN] will come from the business and industry communities"¹⁸

And as an additional benefit of this pursuit of innovation and productivity by Australian businesses, there is a considerable opportunity for the local IT Industry in developing software applications that exploit the availability of high speed broadband. Traditionally we have been great users but not producers of ICT, and the NBN provides the opportunity to shift this balance. Following is an example of an Australian company using broadband enabled IT applications to export to Asia. Businesses such as this would be further supported by the NBN.

¹¹ ABS, Household use of Information Technology, Australia, 2008-09, cat. no. 8146.0, Canberra, December 2009

¹² Access Economics, 'Impacts of Teleworking Under the NBN' Report, July 2010, p.6

¹³ Access Economics, 'Australian Business Expectations for the National Broadband Network', 19 November 2010, p. (i and 19)

¹⁴ A National Broadband Network – Information Infrastructure for the 21st Century (set to be published in *The Australian Quarterly* in Feb 2011. Comments were made by the director of CSIRO's ICT Centre Dr Oppermann.

¹⁵ As above (paraphrased)

¹⁶ As above (paraphrased)

¹⁷ <http://www.aiaa.com.au/pages/20090406mediarelease.aspx>

¹⁸ <http://www.aiaa.com.au/pages/mediarelease101206.aspx>

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Export example: Clive International <i>Australian exporter of e-education services to Asia</i> ¹⁹	
CLIVE	Continuous Learning in a Virtual Environment (CLIVE) is an Australian company providing transnational e-learning, specialising in English language training in Asia
<i>Problem:</i>	Shortage of qualified and Native English Speaking Teachers (NESTs) in Asia
<i>Solution:</i>	NESTs in Australia are linked to students in Asia (Korea, Japan, China) via high definition video conference and IPTV
Strategic advantages	Australia is the only native English speaking country in the same time zone as the target Asian countries. CLIVE has developed pedagogy and systems to effectively deliver transnational education through B2B and B2C models
Korean Market strategy	CLIVE started teaching English via video in 2009 (the private English language training market is worth between USD \$2.5-5bn). A Korean provincial government paid for a pilot project CLIVE has developed English lessons based on the National Geographic Explorer magazine targeting the primary education market. Each Explorer magazine has 3-4 stories targeting various levels of English
Korean market environment	Government policies to encourage e-learning, online training, lifetime learning and computers and internet access in schools. Online education is growing at a faster rate than offline (traditional) education

Council member, Dr Graham Hellestrand, CEO of Embedded Systems Technology Inc, notes that the proliferation of the provision of access to software on demand via a national network will enable the efficient provision of expensive capabilities – including private capabilities – to SMEs and large business in a way that is relatively IP secure and has embedded fiscal controls.

For example, in the *modelling and simulation domains* (including computer aided design & engineering), the often heavy graphical input and output bandwidth requirements have limited these types of applications to, local and/or inconvenient to access, facilities. The current low level of access imposed by the lack of communications bandwidth translates to higher usage fees – companies can reduce rates over 100,000 users relative to 100 users. This enables small companies to compete with the larger companies in provision of services to a much wider customer population.

Also, in the *special, configurable computation domains* – often coupled with high I/O rates – access to singular facilities can be enhanced through the NBN. Such facilities are housed frequently in large and medium sized businesses, universities, colleges and national facilities, like CSIRO. Enabling access, with appropriate security hurdles, encourages the managers of such specialised but scarce resources to look at them as services – in demand facilities should be able to balance demand, and fund growth by cost and elastic pricing – likely reducing the requirement for government funding and refunding. The encouragement to liberalise access will make these facilities available to many more potential users (including small companies and individual consultants) through a uniform access facility – the NBN.

There are other examples of success in the Textile, Clothing and Footwear (TCF) industry. Mr Phil Butler, Chairman of the TCF Industries Innovation Council said, *'we need to embrace change and harness it in the ongoing development of our business models. The NBN will offer us new opportunities to develop innovative products and processes, new ways to interact with customers and our supply chain partners, and increase the reach of training to those who want to enter the TCF industries and upgrade the skills of those already in the TCF industries. The increased connectivity offered by the NBN will also make it more feasible for SMEs to locate in regional Australia and offer increased employment opportunities for people living in those regions'*.

An increase in online shopping will offer a lot of opportunities and challenges for local manufacturers and retailers. A growing demand for customised products for individuals through internet selection and ordering will open up opportunities for local manufacturers to provide the product quicker than overseas options.

As an example, The Footwear Manufacturers' Association of Australia consortium of major industry companies including RM Williams and J. Robins and Sons is taking an innovative new approach to footwear manufacturing in Australia. The consortium will be matching Government funding of \$5.7 million through the

¹⁹ Digital Economy and Broadband Applications: Mission to Japan, Korea and Singapore 18-26 October 2010, Mission Report, pg.21

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TCF Strategic Capability Program to develop a mass customisation model for footwear manufacturing that will more effectively meet the needs of individual customers across Australia.

The project will take footwear design into the retail environment. Computerised foot scanners will be introduced into RM William's network of over 40 retail stores. The information will then be relayed via the internet to Australian production facilities to quickly and efficiently produce footwear to meet individual customer needs.

To achieve success this project needs sophisticated and reliable technology infrastructure. Critical to the project will be ensuring widespread connectivity for all retail locations fitted with foot scanners as well as preserving the integrity of scanned footwear data sent to the manufacturing facilities.

The NBN will make this new business model more efficient and potentially make the adoption of such a model in other industries more viable, especially in regional and rural areas where internet access and bandwidth capacity is currently less reliable. The impact of the NBN may also allow companies to offer increased flexibility in future interactive options to their customers.

Indeed, the NBN will change the way that consumers influence and purchase fashion. Already, in overseas markets the internet is bringing customers closer to designers through online discussions about the design process with customers having real input into the fashion goods that are being produced. Virtual dressing is also a reality at UK fashion retailer Hawes and Curtis, where online customers can choose from 100,000 body shapes in helping them to purchase online. Real time shopping applications that allow consumers to shop online with their friends are also in development.

Also in the field of customisation is Sydney Company, *Shoes of Prey*, which allows its customers to design their own shoes online. Since it began in October 2009 the company has become a net exporter for Australia, shipping 40% of sales to customers outside of Australia within the first year of operation. The company released a promotional YouTube video that became the 5th most viewed on YouTube worldwide and the most commented on video worldwide of the day shortly after its release. The video drove over 500,000 hits to the company's website, which converted to a 300% permanent uplift in sales.²⁰ The NBN will make such opportunities more widely available.

An example of early success in pure online retail is Sean Ashby who owns aussiebum.com.au an online swimwear company which sells globally, "*Ashby expects to sell \$22million worth of underwear and swimwear online this year with most of it going offshore.*"²¹

Consumers across Australia will increasingly want to access innovative online options like those listed above and future innovations that will offer even more interactivity. The NBN will play a pivotal role in allowing all Australians such access.

According to Council member Tom Crago, CEO Tantalus media and former president of the Game Developers Association of Australia, the video game industry in Australia is also set to exploit growing digital business opportunities. The industry currently exports almost 100% of its product, working with publishing partners in the US, Europe and Asia and must continually do better than competitor developers in tough times. In recent years, some Australian companies have had to reassess their business plans to work out which part of the changing market to occupy. Companies that are doing well in Australia are those that, having recognised the shift away from packaged titles/retail models to downloadable digital games, have adjusted their business model and investments accordingly. Indeed, "*...despite the retail slide, online and mobile games are set to spearhead a video game comeback, helping boost sales to more than \$2.5 billion by 2014.*"²² With high speed complex games requiring a high speed broadband network, this industry sector can only benefit further from the NBN as the preferred delivery model for online interactive gaming.

The introduction of the NBN is also well timed for the Australian Broadcasting Corporation (ABC) which is constantly innovating to keep pace with the rapidly changing media sector in which it operates. Council member, Chris Winter, Manager New Services - ABC Innovation provided the following example which outlines some of the ABC's activities that will be enhanced by the NBN.

²⁰ Case study drawn from <http://www.digitalbusiness.gov.au>

²¹ Online selling a two-way trade, The Australian Financial Review, Tuesday 1 February 2011, pg 53.

²² *Playing outside the box Console action slips as gamers go online*, Herald Sun, Thursday 10 February 2011.

While traditional broadcasting is still in wide use, online media access, fixed and mobile, is increasing rapidly. Public expectations of the ABC have changed, and the ABC has been vigorously innovative to meet those expectations.

In 2007, all output areas of the ABC were made responsible for integrating online activities with their traditional platforms, reflecting contemporary consumption patterns in digital media. At the same time, a dedicated Innovation division was created to develop new directions in ABC content, audience participation and new platform distribution.

These structural changes have allowed the ABC to become one of the most flexible and innovative media organisations in Australia. It became an early adopter of social media platforms and the first broadcaster to introduce an online “catch-up television” service, iView. This digital innovation model has also given the Corporation freedom to experiment with new modes of online storytelling and in particular interaction with its audiences.

In April 2010, it launched Bluebird AR, creating a hybrid “participatory drama.” Using a mixture of third-party social media spaces and websites created by the ABC, the story explored—through a fictional narrative—issues surrounding the experimental science of geo-engineering. Audiences could actively participate and play over a six-week period, helping to solve puzzles and drive an emerging narrative, or simply watch the story unfold in real-time across the Net. The experience gained from the Bluebird AR experiment will be particularly valuable as the ABC continues to explore new forms of interactive and participatory storytelling.

These ongoing explorations from the Innovation group and the ABC’s growing curatorial role as it manages the incoming stories from the burgeoning ABC Open project and the many other demands for rich media involvement from the audience will put increasing pressure on its physical connections with them. The promise of ubiquitous, symmetrical and fast, always-on networks is therefore well timed.²³

There are also opportunities for Australian businesses in becoming involved in the building of the NBN infrastructure. For example a key part of the design of the NBN is a proposed satellite system which will consist of two – three geostationary satellites, eight ground stations, and a transceiver (small satellite dish) installed at each end user premises.

Current telecommunications satellites servicing remote and rural Australia which are owned and operated by Optus are not capable of providing the required 12 Mbps data transfer rate. Thus NBN Co plans, via a third-party satellite operator, to build and operate two - three dedicated satellites as part of the NBN.

The satellites will make Australia one of the first areas in the world with third generation satellite technology, with the proposed satellites dedicated to broadband service. The Government’s investment in the NBN can provide opportunities to develop and enhance Australian capabilities and stimulate various sectors of Australian industry such as those companies who can develop ground based equipment, communication devices, and direct-to-home equipment and installation. Efforts should be made to ensure Australian industry participation in these aspects of the NBN roll-out.

g) interaction with research and development and related innovation investments;

Innovation through technology is another vital component of the continuum which is supported by world class research and development. High performance computing is required for virtually all research, and a fibre based network such as the NBN will provide an enhanced platform for future research and development as it has the capability for handling large volumes of data in real-time. This capability is vital in the continued research and development of smart systems to address such issues as water, energy and traffic management.

The NBN satellite system and ground infrastructure referred to above will also provide significant improvements to the current rate of data transfer to regional and remote areas of Australia. This will provide a range of benefits for all socio-economic activities that are dependent upon communications services as well as government services and scientific endeavours and research and development activities that rely upon large amounts of data to be transferred.

²³ Case study provide by Chris Winter, Manager New Services, ABC Innovation.

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The next generation of ground infrastructure will also play an essential role in increasing Australia's Earth Observation System (EOS) capabilities. Observing the Earth from space provides crucial data to support climate change monitoring, weather forecasting and safety activities. It helps protect and manage Australia's natural resources for sustainable development and the future health and prosperity of Australia.

The use of the NBN capability to transport space-derived data will drive both productivity and applications innovation in the earth observation field. Supercomputing technologies and the introduction of high bandwidth communications infrastructure, both in situ and terrestrial will assist to transfer, process, distribute and archive the massive increase in data volumes expected from the next generation of Earth observing satellites.

Attracting investment in innovation is also vital to ensure innovation success and the NBN may prove a decision maker for innovation investments in the future. This is evidenced by the announcement by IBM on 14 October 2010 of the establishment of a Global Research and Development Laboratory in Australia (Melbourne). IBM's former Managing Director Mr Glen Boreham stated at the launch of this initiative that this Laboratory was the most significant investment IBM has made in Australia since it commenced operations here in 1932, and that a significant factor in its decision to site this Laboratory in Australia was the Government's commitment to the establishment of the NBN.

The IBM Laboratory will contribute to IBM's smarter world efforts and undertake research aligned with Australia's national research priorities (an environmentally sustainable Australia; promoting and maintaining good health; frontier technologies for building and transforming Australian industries; and safeguarding Australia). IBM has acknowledged that the NBN will provide an important test bed for IBM's real time instrumentation, monitoring and optimisation technologies that can be used in a range of areas including e-health, water and energy management and natural disaster responses.

Vice President, IBM Research Dr Robert Morris also stated that there was a *"need to understand data in flight as opposed to at rest"*. The delivery of this type of real time data for smart systems – stream computing capability handling large amounts of data – relies on fast, ubiquitous and high capacity broadband, such as that delivered by the NBN.

The IBM Global Research and Development Laboratory has the potential to develop new applications and services for the NBN and demonstrate the contribution it will make to innovation, the growth of new industries and solutions to local and global challenges.

The capabilities of the NBN will also contribute to attracting further innovation investments. For example, Hewlett Packard's multimillion-dollar investment in a next-generation data centre to be located in Western Sydney. In making the announcement on 3 February, the company noted that *"...Business and government face a growing demand for services from their customers and communities. To meet these demands organisations need to address the challenges of aging infrastructure, under-utilised IT environments, application complexity and inflexible business processes. HP's Next-Generation Data Centre in Sydney will provide IT resources to help organisations simplify applications, improve business processes while increasing operational efficiency and reliability"*²⁴ They go on to point out that, *"the facility will provide the infrastructure organisations need for cloud computing services, application modernisation and data centre transformation, enabling more resources to be devoted to innovation and increasing productivity"*.²⁵

The Council agrees with Senator Conroy's comments that *"Infrastructure such as this Next Generation Data Centre exemplifies the type of forward-looking investment activity that the NBN is encouraging in Australia."*²⁶

h) facilitating community and social benefits;

The NBN will provide a greater level of connectedness for communities simply by allowing more people to access online information and participate in online forums and social networking sites. This can contribute to reducing the isolation often felt by those in our community who may have mobility issues, are aged or otherwise prevented from other forms of personal interaction or involvement with their community. The

²⁴ http://www8.hp.com/au/en/hp-news/article_detail.html?compURI=tcm:184-847594-16

²⁵ as above.

²⁶ http://www.minister.dbcde.gov.au/media/media_releases/2011/128

business opportunities offered via online trading will also be open to more people in remote areas, which may provide for an economic boost to those within remote communities. There is also potential for the NBN to address the impact of changing demographics and how we can keep the large retiring workforce engaged productively. The NBN provides an opportunity to engage this element of the workforce in remote mentoring roles and to provide new employment and educational opportunities to allow older Australians to stay connected and continue to make a contribution, providing innovative support and services to the active workforce.

In line with this thinking, the NBN has the potential to facilitate community and social benefits for the active workforce, specifically through teleworking. Home based teleworkers save time and costs by not travelling to work which, among other benefits, reduces road congestion and carbon emissions. Access Economics cites greater job satisfaction among employees as beneficial given that teleworking provides flexible working arrangements. With a growing and ageing population, teleworking also enables carers to undertake employment.²⁷ Continuing operations during emergencies (e.g. snowstorms and terrorist attacks) is an area of focus in the United States where teleworking is considered well advanced²⁸. In Australia, teleworking is also seen as a means of enabling employees to work throughout adverse events including epidemic threats (for example the H1N1 virus in 2009) or transport failures.²⁹ In light of skills shortages, teleworking is also a means of retaining existing employees. IP Australia offers flexible employment arrangements which rely on teleworking to retain highly skilled patent examiners located outside of Canberra. Advantages to home based work and out posted work include improved retention, additional individual productivity and reduced commuting. The NBN provides an opportunity to address challenges including broadband access and long initial set up timeframes including unexpected delays in broadband provision.

i) the optimal capacity and technological requirements of a network to deliver these outcomes.

We should be careful about underestimating the needs of the future as evidenced by the following statements from key industry leaders of the past:

"I think there is a world market for maybe five computers" – Thomas Watson, Chairman of IBM 1943
"There is no reason anyone would want a computer in their home" – Ken Olson, Present Chairman and Founder of Digital Equipment Corp, 1977.
"640k [of RAM] ought to be enough for anybody" Bill Gates, Chairman of Microsoft, 1981

Clearly when these statements were made, there was little appreciation of the technological changes and consequent opportunities that lay ahead and it is vital that in making an investment of this scale, the Government looks to 'future-proof' technologies. There is a range of existing technologies already delivering broadband access to many Australians, including shared access technologies such as that provided by wireless. In discussing these technologies Professor Rod Tucker³⁰ from the University of Melbourne notes that *"the electromagnetic spectrum used by wireless is limited, and as more users share the available wireless spectrum, the experience of all users is degraded."*³¹ He goes on to refer to some wireless carriers touting rates of up to 50 Mbps, but points out this is achievable only if no-one else is using the spectrum. In this instance the only option to increase the capacity of the technology is to build many more towers with their attendant social and community issues.

Another shared access technology Professor Tucker highlights is hybrid fibre coax (HFC), which is the technology used by Telstra and Optus for approximately 2 million homes in Melbourne and Sydney. However, he goes on to point out that again, *"in HFC networks, the available bandwidth on the coaxial cable is shared by a number of users in the street. The more people using the network, the lower is the bandwidth per user."*³²

The alternative is a direct access technology such as Asymmetric Digital Subscriber Line (ADSL) which is a technology for transmitting digital information at a high bandwidth on existing phone lines to homes and

²⁷ Access Economics, 'Impacts of Teleworking Under the NBN' Report, July 2010. pp.5-6

²⁸ federaltimes.com, Stephen Losey, 'Obama signs bill to increase telework', 9 December 2010

²⁹ Access Economics, 'Impacts of Teleworking Under the NBN' Report, July 2010, pp.7

³⁰ **Rod Tucker is a Laureate Professor at the University of Melbourne. He is Director of the Institute for a Broadband-Enabled Society (IBES) and Director of the Centre for Ultra-Broadband Information Networks (CUBIN), in the University of Melbourne's Department of Electrical and Electronic Engineering.

³¹ http://www.computerworld.com.au/article/357039/professor_rod_tucker_access_technologies_broadband_policies/

³² As above.

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businesses. However, ADSL is by its nature asymmetric, using most of the channel to transmit downstream to the user and only a small part to receive information from the user. ADSL is therefore not suited to many emerging technologies and changes in business activities which will see individuals needing the ability to upload as well as download large volumes of data. Indeed symmetry is required for any of the 'real time' applications.

The other direct access technology is fibre to the premises (FTTP), which is the technology primarily proposed for the NBN. As Professor Tucker explains, *"the FTTP network is based on a gigabit passive optical network (GPON) technology delivering a dedicated 100 Mbps to the home. A fibre from the telephone exchange is connected to a user modem in each home, and the modem is connected to the home network. The important point with this technology is that "the capacity of FTTP is virtually unlimited. In fact, the capacity of a single optical fibre is more than 10,000 times the capacity of the entire wireless electromagnetic spectrum."*³³ This implies that FTTP as the core operating in parallel with complementary wireless technologies where appropriate (as in the NBN design) is the logical, future-proof technology for our national network.

Indeed, the Council notes recent debate in the press regarding Telstra's new generation wireless technologies' upgrade and suggestions that it will provide an alternative to FTTP services. As noted above, the Council's position remains that the speed and capacity of a fibre based network is unquestioned and required, but that given the geographic distribution of Australia's population and the consequent costs of providing fibre access to all, it was always going to include the appropriate wireless technologies to provide ubiquity of access. This is the NBN.

The Council supports the work of the recently launched Australian Centre for Broadband Innovation (ACBI) which will develop and trial new applications and services for the NBN. Their establishment of a full emulation of an Access Seeker network will allow real world development, testing and evaluation of broadband applications.

In summary, the Information Technology Industry Innovation Council members firmly believe that the quality of Australia's future lies in the innovation, productivity and hence global competitiveness of its businesses and governments. The infrastructure, skills and policy settings that support this future are absolutely critical. The NBN is the technology infrastructure of the future. We should not compromise our future with anything less.

I am happy to discuss these points with you in more detail if that would assist. Please feel free to call me on 0411429930 if there is anything more the Council or I can do.

Kind regards,

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³³ http://www.computerworld.com.au/article/357039/professor_rod_tucker_access_technologies_broadband_policies/

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Mr Michael Clifford, Queensland State Secretary, Finance Sector Union

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