Digital Economy Future Directions : Consultation Paper

Submission to the Department of Broadband, Communications and the Digital Economy

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1. Introduction

Engineers Australia is the peak body for engineering practitioners in Australia and represents all disciplines and branches of engineering, including information technology. Engineers Australia has over 84,000 members Australia wide and is the largest and most diverse engineering association in Australia. All members are bound by a common commitment to promote engineering and facilitate its practice for the common good. We appreciate the opportunity to provide the following comments on the consultation paper.

2. Engineering and the digital economy

Traditionally, engineers delivered services in person, as their work often required extensive face to face interaction with clients. This restricted the opportunity for expanding domestic markets for engineering and restricted opportunities for the export of services, as firms were required to maintain a local office in each market or fly in personnel.

The telecommunications revolution overcame this barrier, particularly with regard to exporting engineering services by creating technology that allows engineers to work on overseas projects from their Australian office (remote work). Technology has reduced the need for face to face contact, allowing engineers to communicate and co-ordinate tasks with clients while working in different regions and countries.

Engineers are variously users, creators and managers of the information and communication technologies (ICTs) that enable the digital economy. Engineers work globally on developing and managing engineering solutions to challenging problems and needs and provide leading edge examples of the benefits of participating in the digital economy. Broadband networks are now essential for engineers to participate in the digital economy by delivering enhanced access to modelling and simulation tools that are widely used to innovate and improve product and system designs.

The export of engineering services increased dramatically in the late 1990's and early 2000's. The most commonly cited reason was a decrease in domestic demand, forcing engineers to focus more on export of their services. Growth in global markets also provided more opportunities. The expansion of export of Australia's engineering services continued, even through the economic boom. While the current economic crisis may see some diminution of demand in some areas of engineering, Engineers Australia expects that there will be a strong demand for engineering skills particularly in light of the response of many governments to invest in large infrastructure spending, which will depend on engineering skills for completion. Maintenance of demand for Australian engineering skills by overseas markets, and the efficient delivery of engineering services domestically depend on high quality telecommunications infrastructure and an efficient digital economy. The National Broadband network is a key component of this.

3. What does Digital Economy success look like?

The introduction to the consultation paper states "*The Australian Government is seeking to increase the effective use of networked information and communication technologies by consumers and business to drive higher productivity growth and community participation in the digital economy*".

In terms of productivity, over the last 20 years, we have been in a gradual process of transition in which more and more information transactions have been accomplished through electronic communications, replacing older paper-based methods. However, we have not just replaced paper-based methods. As more resources become "apparently" available in times of relative prosperity, we think of things that it would be good to do, given the relative "ease" with which it can be accomplished using electronic communication. Therefore, although electronic information transactions can be more efficient (in terms of real costs, including the cost of unpaid labour), the number of transactions has undoubtedly increased.

The creation of unnecessary extra work, including information overload, needs to be managed and it is essential that players in the digital economy are well equipped (skilled) in managing the emerging issues which would otherwise create inefficiencies in the digital economy and place Australia at a disadvantage with its digital trading partners.

In terms of what a successful digital economy might look like, at the least, Australia should be aiming for the following:

- 100% of school leavers to be computer literate with a significant number of the higher achievers having developed the necessary skills and knowledge to creatively develop and use applications to contribute to the digital economy environment.
- Output from higher education providers is to meet the needs of Australian Industry and be at the standard expected by engineering and ICT professionals bodies
- Access to broadband networks must satisfy business, educators and consumers needs in terms of security, service level and reliability.

The success of the digital economy will be heavily reliant on adequate infrastructure. This is discussed in a later section.

4. Open Access to Public Sector Information

Government has a number of roles including achieving social goals, rectifying market failures, managing macro-economic policy and caretaking of community property. To make effective judgements in all these areas require reliable data.

Engineering and technology-services are particularly dependant on reliable data, as information reduces uncertainty and hence ensures that unnecessary capital is not spent in over-design or, conversely, that under-design does not lead to expensive failures. The availability of reliable data for modelling and simulation promotes a rapid path to innovation, avoiding overdesign.

Engineers Australia members utilise many categories of public sector information, ranging from ABS statistics, meteorological data relating to rainfall, to spatial and land information and would fully support better access to this data.
An issue for engineers is the availability of data held by government and the cost of that data.

Pricing appears to be based on the cost of collection, rather than any other measure. The relationship between the cost of data collection and the manner in which the data is used to the benefit of the community is often complex. The cost charged by government departments and agencies for data should be based on the cost of provision.

Some options to consider with regard to licensing could be that as part of the agreement to supply the data, the user must offer to provide the analysis of the data back to the government department or agency free of charge. Adding value to the sharing of information will increase other opportunities to share in the digital economy in the broader national interest. Where a user does not want to disclose the result of the analysis to the government department or agency, the user should be charged, possibly based on the benefit resulting from the data.

5. Digital Confidence

In terms of consumer confidence in using the digital economy, Engineers Australia fully supports regulatory frameworks that encourage business to adopt practices that respect user privacy and security.

The community at large must be educated about the opportunities of participating in the digital economy and the dangers of doing so (typical issues of electronic security, invasion of privacy etc). Too many constraints (such as content filtering) may penalise Australia's ability to participate competitively in the digital economy. As a result, people need to be better educated in managing both the strategic advantages and risks of the digital economy so that they can look after themselves.

Given that the digital economy is global and we deal with other organisations and cultures, a framework for ethical dealing in the digital economy would be useful, as would programs that promoted e-security awareness amongst consumers.

6. Development of Australia’s Knowledge and Skills base

Engineers Australia believes that people need to be educated in the scope of information available, which can be reused creatively in an electronic market place to produce new opportunities and benefits: public sector information availability (eg spatial data) could be employed to create new services of commercial and community benefit.

Digital economy benefits will be achieved if we are prepared to change the way we currently do things (replicating what we do in the old economy in the digital economy may not be the most effective way of participating in the digital economy).

In terms of shortages of professional skills for ICT, the issues for computer science and electrical engineering are similar to those for other types of engineers.

The short term solution has been to increase the number of skilled migrants in the permanent migration scheme, and a very large increase in the temporary skilled migration scheme. However, until very recently, there has been no concerted effort to increase the domestic supply of engineers. This requires a multi-pronged approach, starting with our education system at primary school level.

Engineers Australia believes that Australia needs a national skills strategy to address these issues rather than a piecemeal approach. This requires the involvement, collaboration and leadership from business, industry and government.

To ensure that Australia has sufficient skills in the future, the following needs to occur:

- Obtain more timely and robust data to identify Australia's skills capability and future skills needs
- Provide greater support for the teaching of maths and science in both the school and university systems
- Provide incentives for people to become fully qualified science and maths teachers
- Generate an interest by primary and secondary students in engineering, maths and science through exposure to simple real-world applications of theory to aspects of their day-to-day lives
- Provide primary and secondary students with opportunities to interact with engineers and scientists to spark their enthusiasm and to improve awareness of the rewarding careers available - thereby increasing demand for university courses in those disciplines
- Coordinate programs of government, community and professional organisations to provide a solid, technical, experience-based resource for teachers and schools across Australia
- Increasing the level of support for university students in these disciplines to improve the retention rates
- Provide increased support for post graduate courses in these disciplines to ensure that Australia has an appropriate skills based in the advanced technical areas
- Address workplace culture, remuneration and working conditions to encourage retention of technology professionals
- Develop programs to assist technical professionals upgrade their skills or transfer their expertise into alternative industries
- Develop programs to encourage science and engineering professionals to broaden their capabilities to potentially engage in the education system
- Support initiatives to retain skills in the workforce, particularly those with family responsibilities, and older employees making the transition to retirement.

- Ensure that there are enough places at university and at TAFE Colleges
- Provide more post-graduate programs for specialist engineering and science fields and support structured training and education post-graduation.
- Support policies that break down negative stereotypes of engineering and science to facilitate greater participation by women in the profession.

7. Ensuring Australia's regulatory framework enables the digital economy

No comment

8. Digital Economy and the Environment

There are significant environmental benefits to be gained from a greater uptake of ICT. Some general priority areas in the digital economy that could benefit economic returns, environmental sustainability, and job creation are:

- Digital Ecosystems
- Renewable energy powered ICT e.g. wind generators, solar cells, liquid biomass (including management and feedback of excess power into the electricity grid)
- Intelligent monitoring and management systems in sustainable agriculture (including organic agriculture)
- Digital technologies to monitor emissions from Deforestation and Forest Degradation (REDD)
- Community ICT planning for server, memory and web capacity; similar to other necessary infrastructures
- The 2008 Brunel Lecture, *Entering the ecological age: the engineer's role*, concluded that we could move to a sustainable future addressing transport, water and waste, energy, food and communication with a number of urban design principles that need to be supported with smart and available technologies. The digital economy will be used to apply sustainability to all aspects of life and human endeavour.[1]

The concept of tele-working and videoconferencing to reduce the number of people commuting has not been as widely used as many people predicted and there is little support for research to understand the reasons why. One reason may be that there is a failure to promote research on the understanding of human behaviour among engineering schools, and particularly schools of computer science and information technology. Information technology, by and large, is taught by people without any formal understanding of human behaviour. Even management schools pay little attention to human behaviour except as an elementary level undergraduate unit within their courses.

[1] Institution of Civil Engineers, 2008, *Brunel International Lectures*, *Entering the ecological age: the engineer's role*, http://event.concepglobal.com/profile/web/index.cfm?PKwebID=0x56446d02

9. Measuring the Digital Economy and its impacts

No comment

10. Infrastructure

Engineers Australia believes that Australia's telecommunications infrastructure is a vital component of effective economic activity and growth, and has a fundamental impact on the Australian community's standard of living. The level and quality of telecommunications infrastructure are fundamental issues for the digital economy.

Telecommunications infrastructure provides the means for business to communicate with suppliers, customers and employees and allows local business to access Australia's and the world's marketplace. Individuals are able to broaden their communications networks and their access to information.

Over the last decade, the Australian telecommunications industry has been influenced by several key factors that have changed the way in which telecommunications infrastructure is delivered. These include:

- The creation of a deregulated, competitive telecommunications industry
- The rapid growth in mobile and wireless services and technology to support them
- The privatisation of Telstra
- The advent of "next generation" internet protocol broadband services for business, personal and entertainment purposes.

In 2007, Engineers Australia produced a Telecommunications Infrastructure Report Card, which examined:

- The quantity of fixed infrastructure for telecommunications transmission
- Whether there is an adequate level of access to that fixed infrastructure by customers
- The availability of infrastructure for mobile communications

The Report Card assigned rankings to each statistical division in all States and Territories. The ranking methodology was developed to apply across the whole of Australia. The Report Card assigned a rating which ranges from A (very good) to F (inadequate). The ratings are based on the fixed access infrastructure on a household density basis and mobile infrastructure on a land density basis. The rankings do not take into account comparisons between Australia and other countries due to the unavailability of suitable benchmarks. The Report Card does not comment on affordability or terms of access to that infrastructure.

Unsurprisingly, the Report Card has found Australia's telecommunications infrastructure is heavily concentrated in Eastern Australia, particularly in and between capital cities. This leads to a reasonable level of access in these areas, but this diminishes for rural and regional Australia.

Melbourne, Sydney and Brisbane are interconnected by high capacity links and these provide infrastructure benefits for centres such as Bendigo and the Gold Coast that are adjacent to those links. For other locations, including some State capital cities such as Hobart and Darwin, infrastructure provision is generally poor.

Infrastructure is readily available in some areas, but in other areas is not provided due to lack of profitability for infrastructure providers. The areas that received a score of “F” for instance, have low population density where, if the infrastructure was provided, the charges may be unattractive for users. Governments have variously implemented subsidy programs, one off or ongoing, to improve access to infrastructure in areas such as these.

There are a number of government policies and programs relating to aspects of the telecommunications industry and to infrastructure in general, and government adopted a market-based strategy with selective intervention where considered appropriate. However, Engineers Australia felt that there is no comprehensive strategic plan or long term vision at a national level for telecommunications infrastructure. The development of such a plan or vision would encourage infrastructure providers to be more proactive in identifying and appraising future infrastructure projects. This is relevant for areas that are poorly served.

In general, the market for telecommunications services in rural and remote parts of Australia cannot commercially support duplication of (or in some cases, any) infrastructure. Providing the benefits of competition (or any service in some cases) requires a government funding contribution. In this instance, government funding can be justified on the basis of benefits to the economy and community that are derived from the availability of telecommunications.

A principal that can be adopted where full or partial government funding is provided to a carrier in the circumstances outlined above is that other carriers should be allowed access on reasonable terms to the infrastructure. This would encourage competition and provide a degree of neutrality between those carriers receiving and those not receiving government funds. The host carrier should be able to derive the benefits of hosting other carriers through additional revenue.

A number of highly important aspects of telecommunications policy are now converging, and their outcomes will have a profound impact on the future of Australia’s telecommunications infrastructure.

Our Report Card concluded that overall, Australia is reasonably well-served by its telecommunications infrastructure, but made the following recommendations.

1. Australia needs an ongoing, regularly reviewed and updated strategic plan for telecommunications infrastructure development.
2. Government should ensure that regulations and subsidies (if appropriate) are regularly reviewed and adapted as needed.

3. Unnecessary duplication of infrastructure should be avoided, particularly where government subsidies are given. Where there are no government subsidies, policies should encourage carriers to avoid duplications through appropriate access regimes.
4. A requirement to support inter-carrier roaming on any mobile infrastructure funded by government.

11. Conclusion

Australia needs a strong engineering capability to be internationally competitive in the digital economy and to enable a leading role in the future global economy. Engineers are variously users, creators and managers of the information and communication technologies (ICTs) that enable the digital economy. Engineers work globally on developing and managing engineering solutions to challenging problems and needs and provide leading edge examples of the benefits of participating in the digital economy. Broadband networks are now essential for engineers to participate in the digital economy by delivering enhanced access to modelling and simulation tools that are widely used to innovate and improve product and system designs.