



Australian Government

Department of Broadband,
Communications and the Digital Economy

Digital Economy Future Directions Consultation Paper

A. Introduction

The Australian Government is seeking to increase the effective use of networked information and communication technologies (ICTs), especially the internet, by consumers and all businesses to drive higher productivity growth and community participation in the digital economy.

The ‘digital economy’ refers to the global network of economic and social activities enabled by ICTs, particularly the internet. It includes commercial transactions, personal dialogue, information, entertainment and delivery of services. The term is often used interchangeably with ‘internet economy’ and ‘information society’.

In August and September 2008, the Australian Government consulted industry and other stakeholders on the future of the digital economy via three workshops and a high level forum. Senator Stephen Conroy, Minister for Broadband, Communications and the Digital Economy, chaired the forum.

The key outcome of these consultations was an announcement by the Minister that, in consultation with industry and other stakeholders, the Australian Government would prepare a *Digital Economy Future Directions* paper for release in the first half of 2009. The document you are reading is a draft paper that is part of the ongoing consultation on implementation of the themes and suggestions raised in the workshops and the forum. It has been circulated widely across Australian Government agencies and benefits from a ‘whole of Government’ approach.

The *Future Directions* paper will describe the nature of the digital economy, the benefit it offers Australians and include a series of case studies with examples of Australians using the internet in innovative ways. It will also describe the respective roles of government, industry and other stakeholders in maximising these benefits and opportunities from the Australian Government’s existing commitments to facilitate the digital economy. This consultation paper will inform that part of the *Future Directions* paper that outlines the roadmap for Government and industry to maximise Australia’s online participation.

The Government appreciates that there are currently several live tender and funding processes underway that have implications for how we will use the internet in future—specifically, the National Broadband Network (NBN) process and the internet service provider (ISP) filtering ‘live’ pilot.

The *Future Directions* paper is not intended to address any matters relating to the NBN process, which is a live, competitive process bound by probity considerations. In a tender process such as the NBN it is of critical importance that integrity and confidentiality is maintained to ensure that the commercial and policy objectives of

the Australian Government are not compromised. This means that the Australian Government is not in a position to comment or speculate on the outcomes of the process, or to disclose any information not already in the public domain. In addition, the paper is not intended to address any matters concerning the ISP filtering 'live' pilot.

Industry and other stakeholders are invited to provide input to and comments on the specific topics raised below. Please forward your responses to DEFutureDirections@dbcde.gov.au by **Wednesday 11 February 2009**, clearly indicating any material that is commercial-in-confidence. The Department of Broadband, Communications and the Digital Economy will collate and edit input for the *Digital Economy Future Directions* paper before publishing it in the first half of 2009.

B. What does success look like?

Australians are digitally aware and want to engage online. Many Australian businesses and individuals have realised the digital economy value proposition and embrace the benefits that the use of the internet and other technologies enable.

The number of Australian households and businesses connected to the internet and performing online activities has steadily grown since the late 1990s. As at June 2008, there were 7.23 million internet subscribers in Australia¹. Over 78 per cent of all internet connections are broadband, continuing the steady upward trend in broadband adoption experienced over the last few years. Australians have demonstrated their willingness to embrace broadband on new platforms with wireless broadband subscriptions increasing almost 90 per cent since late 2007.

There are many positive signs among Australian businesses of the use of technology to improve processes and services. Eighty-one per cent of Australian businesses are using the internet and they are doing so as much in metropolitan as in regional areas. This use is primarily for financial transactions, such as banking and invoicing, and for electronic lodgement with government organisations. Around one-third of firms are using the internet to place and receive orders, to enable employees to work from home or to research improvements in their products and services.

These figures are encouraging, but significant scope remains to increase the contribution the internet makes to productivity and economic growth. For example, the total business income derived from activity on the internet, while growing rapidly, is still only three per cent. This growth will accelerate significantly as the Government makes the National Broadband Network and the Digital Education Revolution its priorities.

In his speech to the Australian/Melbourne Institute New Agenda for Prosperity Conference (Melbourne University, 27 March 2008), the Prime Minister, Kevin Rudd, said:

In the coming decades our ability to engage in the global digital economy of the twenty first century will be a key driver of our productivity growth. Building a high-speed National Broadband Network will give Australia a platform of modern

¹ Australian Bureau of Statistics (2007) 8153.0—*Internet Activity in Australia*, June 2008.

infrastructure that will allow business, education institutions and families to reap the full benefits of participation in the global digital economy.

Questions for industry and other stakeholders

What markers of success can government, industry and other stakeholders establish?

How will we know when we have maximised the potential of Australia's participation in the digital economy?

C. Consultation topics

1. Open Access to Public Sector Information

The Australian Government publishes and makes freely available a considerable amount of information to the public through various policies including Government copyright and freedom of information. However, the internet and Web 2.0 technologies are increasing the potential for economic and socially-valuable use and reuse of information created by governments, and there is a growing volume of support for the notion that the Australian Government should provide access to public sector information (PSI) on terms that clearly permit the use and re-use of that information. PSI includes Government produced data (such as Australian Bureau of Statistics (ABS) and geospatial data) and copyright protected materials (such as reports and other documentation). It can also include materials that result from publicly-funded cultural, educational and scientific activities.

The potential for greater access to PSI to promote innovation and the digital economy provides a rationale for the Australian Government to explore its own policy options and work with state and territory governments to provide more open access to PSI in appropriate circumstances. 'Open access', in this context, can mean releasing materials on terms and in formats that permit and enable public use and reuse of that material.

Internationally, the OECD's 2008 Seoul Declaration and the supporting policy framework—Shaping Policies for the Future of the Internet Economy—provide principles and guidelines for access to publicly-funded research data. In Europe in 2003, the Council on the Re-use of Public Sector Information and the European Parliament adopted the Directive on the Re-use of Public Sector Information. In the UK in 2007, the Government welcomed the findings of the Power of Information Review that noted that PSI underpins a growing part of the economy and that amount is increasing at a dramatic pace.

In Australia, there is a range of initiatives at the national and state and territory government levels promoting or exploring open access to PSI. For example, the 2008 Review of the National Innovation System recommended the establishment of a National Information Policy. In Queensland, the Office of Economic and Statistical Research has released and is implementing the Government Information Licensing Framework. In addition, the Victorian Parliament is currently conducting the Inquiry into Improving Access to Victorian Public Sector Information and Data.

The Australian Government recognises that open access to certain categories of PSI can achieve economic benefits and social well-being.

New and emerging mapping tools and applications allow data to be combined on a map in innovative ways that can lead to the development of better consumer experiences and also better public service delivery and policy development. The rapid take-up of mobile devices with in-built global positioning systems, combined with the growth of websites with geo-tagging and other geographical information, has seen increased private sector interest in spatial data as a driver of new and improved product and service offerings. For example, real estate sites, such as realestate.com.au and domain.com.au, include geographical information together with house sale and rental listings. Telecommunication providers such as Telstra and Vodafone have recently unveiled location-based service offerings.

Geo-location data can also improve government and community groups' ability to serve the public interest. The Sentinel Bushfire Monitoring System is an example of an internet-based mapping tool designed to provide timely spatial information to emergency service managers across Australia. The mapping system allows users to identify fire locations with a potential risk to communities and property. It can be accessed using a standard web browser. Sentinel obtains data from the NASA Earth Observation Satellites; Terra and Aqua. The raw image data is received by GeoScience Australia's Data Acquisition Facility at Alice Springs and the data can be queried and added to dynamically-created maps using a web-based mapping system.

Spatial information is increasingly used in many sectors of the economy and is having a direct and positive impact on productivity. Industry reports² provide examples of economic modelling that identify and estimate that the use of spatial data and high precision positioning systems can increase productivity across a range of sectors such as, agriculture (grains and cattle), forestry, fisheries, property and business services, construction, transport, electricity, gas and water, mining and resources, resource exploration, communications and government.

In addition to improving productivity, digital technologies permit the cross-correlation and analysis of large data sets from public sector agencies in ways that can identify longitudinal trends. In turn, this drives more effective decision-making and policy development. For example, the Western Australian Data Linkage System links that state's core population health data sets and provides de-identified, trend data to research, planning and evaluation projects that aim to improve the health of Western Australians.

At the user level, sites such as Swivel (known as 'YouTube for data'), ManyEyes and PolicyMap provide any member of the public with the ability to 'mash-up' datasets. For example, Swivel contributors have used ABS data graphs to prepare and post on

² The CRC for Spatial Information (CRCSI) with support from the Victorian Government commissioned the Allen Consulting Group to develop a report on the economic benefits of high precision positioning. The draft report, with minor editorial issues to resolve was released in October 2008.

ASIBA's submission of 15 October 2008 to Infrastructure Australia, www.asiba.com.au/clients/asiba/UserFiles/File/Submissions/Submission%2015%20October%202008.pdf

The Value of Spatial Information, Prepared for the CRCSI & ANZLIC—the Spatial Information Council, March 2008, ACIL Tasman, www.crcsi.com.au/uploads/publications/PUBLICATION_323.pdf

the site analysis of Australia's employment data and the proportion of Australia's population over 65.

There is considerable interest in increasing access to publicly-funded cultural, educational and scientific collections. In some instances, publicly-funded institutions have already made their material available on open access terms. For example, in 2008, the Powerhouse Museum in Sydney became the first museum in the world to release publicly-held historical photographs on the photo-sharing platform Flickr under a 'no known copyright' identifier. Geotags are added to create an interactive map documenting the position of the photographic content. The Museum is also releasing its 'Photo of the Day' online under a Creative Commons license. Similarly, in January 2008, the NSW State Library released 100 images of historical Australian 'firsts' on Flickr, also under a 'no known copyright' identifier. In the educational space, the University of Southern Queensland's OpenCourseWare program provides access to free and open educational resources across several disciplines for students and teachers worldwide.

As open access to PSI is a 'whole of government' issue, several departments and agencies are currently working together to scope policy development for a national approach to open access to certain categories of PSI in appropriate circumstances. This work will require engagement with states and territories and will need to include analysis of cost benefits and financial implications, legal frameworks and implementation processes.

Questions for industry and other stakeholders

What categories of Public Sector Information (PSI) are most useful to industry and other stakeholders to enable innovation and promote the digital economy?

What are priority issues that will facilitate the use of PSI?

If PSI is made open access, what are the best formats to enable and promote use and reuse?

If PSI is made open access, what licensing terms would best facilitate and promote its use and reuse?

Should licensing terms distinguish between commercial uses and non-commercial uses and reuses?

Are there other examples of innovative, online uses of PSI?

Is there any additional economic modelling or other evidence to show the benefit to Australia from open access of PSI?

2. Digital confidence

The next wave of growth in the digital economy is predicted to be driven mainly by increasing revenues through growing spend per user rather than increasing the number of users.³ Already, data released by the Australian Communications and Media Authority (ACMA) confirms that those Australians with broadband access are increasingly becoming 'heavy internet users'. With innovations including mobile internet, a high-speed broadband network, digital television and broadcasting and

³ Booz & Co, *Digital Confidence—Securing the Next Wave of Growth* (2008).

fixed-mobile convergence, it is likely that Australian households and consumers will increasingly have a ‘triple play’ of digital network connections—one for the internet, another for digital television and a third for the telephone.

To enable Australian companies and consumers alike to play a strong role in the next wave of growth, it is important that government and industry collaborate to ensure that people are as confident to interact and engage via the internet as they are offline. Businesses that have digital confidence will expand their online service offerings and consumers with digital confidence will increasingly find information online, communicate and interact via the internet and shop online.

The Australian Government recognises that ensuring online confidence for businesses and consumers requires global solutions. In June 2008, the Australian Government adopted the OECD Seoul Declaration, which outlines a shared global vision for the future of the internet economy. The Declaration will guide the work of the OECD and its member countries in pursuing digital economy objectives over the next few years, including in the area of enhanced international collaboration in cyber safety and e-security initiatives.

Consumer confidence

The Government can help promote consumer digital confidence by setting a regulatory framework that encourages businesses to adopt practices that respect user privacy and security. Government, industry and other stakeholders also have roles to play in educating Australian families and consumers about a range of issues including privacy, how to stay safe online and how to look after their electronic security.

With the increasing reliance on the internet in people’s everyday lives, including for shopping, banking and social interaction, it is important that Australians know how to protect themselves from online threats. The Australian Government provides a range of awareness-raising and education initiatives to improve the e-security of home users and small businesses.

These focus on reducing the e-security risk to government networks and critical infrastructure and on enhancing the protection of internet users from electronic attack and fraud. For example, the Government’s e-security website, Stay Smart Online⁴, provides information on protection against e-security threats such as malicious spam, phishing and spyware that can lead to identity theft and financial loss. In addition, the Government is currently developing and implementing several other initiatives, including an annual National E-Security Awareness Week in partnership with industry and community organisations, a National E-Security Alert Service that provides information on the latest e-security threats and vulnerabilities, and an e-security education module for Australian school children in Years 3 and 9 due for release in the first half of 2009.

A review of the Australian Government’s e-security arrangements was recently completed. The outcomes of the review will inform the future range of e-security activities targeting consumers and business.

⁴ www.staysmartonline.gov.au

Australians already enjoy a national privacy regime that regulates the collection, use, disclosure, quality and use of personal information by Commonwealth agencies and certain private sector organisations. This regime also gives individuals the right to access and correct personal information about them. Some states and territories also have their own privacy regimes regulating their agencies.

The Government acknowledges that advances in information technology significantly impact on individual privacy and believes that information privacy laws should operate consistently and effectively. In August 2008, the Australian Law Reform Commission (ALRC) released its review of Australia's privacy laws—*For Your Information: Australian Privacy Law and Practice*. The Government has indicated it intends to bring Australia's privacy laws into the 21st Century in response to the Report, which contains 295 recommendations about Australia's privacy framework. The Terms of Reference of the ALRC Inquiry specifically referred to pressure placed on the existing privacy regime by new technologies: one of the four factors that led to the Inquiry was 'rapid advances in information, communication, storage, surveillance and other relevant technologies.'

In the first stage of its response to the ALRC recommendations, the Government has undertaken to focus on recommendations relating to creating a set of Unified Privacy Principles, health and credit reporting regulations and improving education about the impact on privacy by new technologies.

Just as technology can dramatically increase the amount and variety of personal information collected, the impact of data theft or loss is correspondingly magnified. Several well-reported overseas examples of data breaches have shown how the personal details of millions of people can be disclosed in an instant, increasing the potential exposure to identity theft and fraud for those affected. Recognising this risk, the Australian Privacy Commissioner released in August 2008 a Guide to Handling Personal Information Security Breaches that sets out protocols for agencies and organisations to prevent a data breach and, in the event of such a breach, steps for minimising the impact on individuals.

Industry also has a role to play in promoting user privacy. Major internet browsers such as Safari, Microsoft's Internet Explorer 8 (beta) and Mozilla's Firefox 3.1 (beta) have introduced features that allow users to switch to private web surfing. In addition, Microsoft's digital identity management solution decouples the user identifier from personal information that could compromise a user's privacy.

Government and industry must also work together to promote consumer safety online. Australians need to understand how to act responsibly as cyber-citizens, how to protect personal information and identity online and to be aware of and respond appropriately to other risks such as cyber-bullying.

The Australian Government announced a comprehensive plan for cyber-safety as part of the 2008–09 Budget. Funding of \$125.8 million over four years was committed for a series of measures to combat online risks and help parents and educators protect children from inappropriate material. The Cyber-Safety Plan includes funding for education and information measures, law enforcement, helplines and websites, ISP filtering, consultative arrangements with industry, child protection bodies and children, and research to identify possible areas for further action.

In addition, the Government recognises the need for ongoing education about new online platforms and services such as social networking sites. In September 2008, ACMA released a fact sheet—*Social Networking: Staying Safe Online*⁵—that identifies potential risks from using such sites, what Australians can do to minimise their exposure to the enumerated risks and where to go for assistance if they do eventuate. The Office of the Privacy Commissioner has also produced material aimed at educating individuals about how to protect their information when using social networking sites⁶.

Business confidence

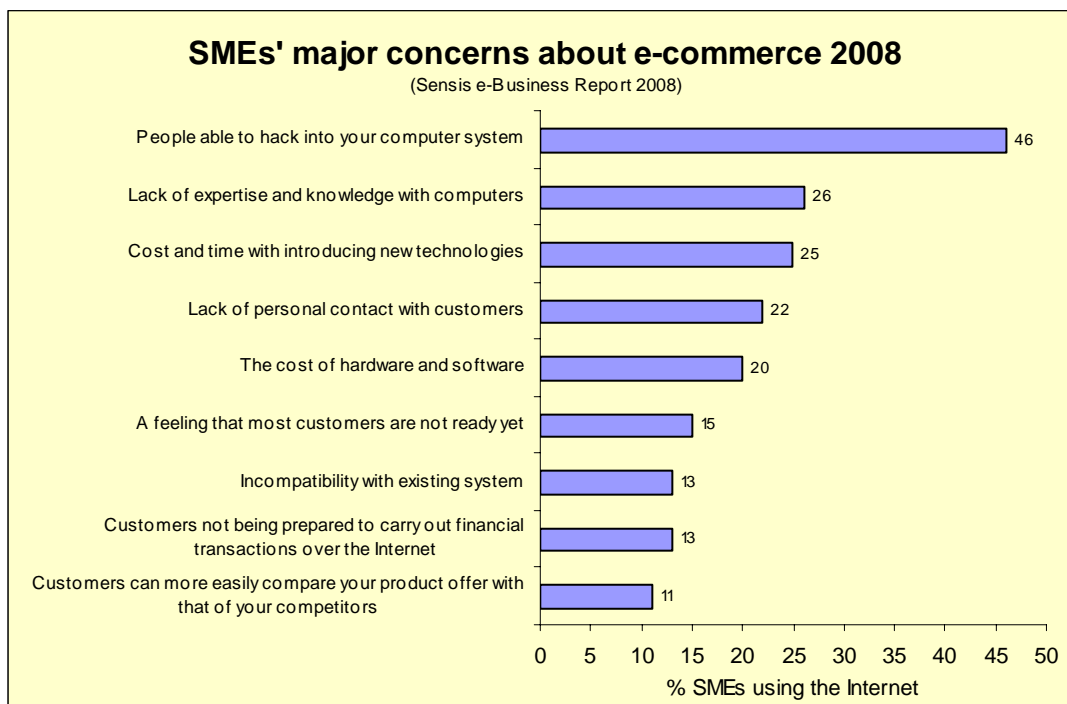
Inspiring businesses to have confidence online and conduct commercial activities via networks such as the internet is an important part of growing Australia's digital economy. It can maintain and expand the marketplace for Australian businesses. It will also have a flow-on effect of encouraging greater online participation by Australian consumers who are attracted by better online offerings.

Business digital confidence operates on two levels—firstly, the confidence of Australian businesses generally to develop a website to facilitate ordering online, and secondly, the confidence of specific industry sectors that are driving online take-up—for example, banking, travel, entertainment and retail. Industry-led efforts can promote confidence at both levels.

For Australian business generally, recent data produced by Sensis in its *E-business Report 2008* suggests that the major concerns about e-commerce held by small and medium enterprises (SMEs) are negative assumptions on the vulnerability of computer systems and customer participation, lack of experience and costs associated with using new technologies. It is possible that these concerns are also shared by the larger corporations.

⁵ www.acma.gov.au/WEB/STANDARD/pc=PC_311348

⁶ www.privacy.gov.au/faqs/ypr/index.html



SMEs account for 99 per cent of businesses in Australia⁷, and make a substantial contribution to the Australian economy. The internet can assist SMEs to transform or automate key business processes, reduce costs and expand market reach. For example, data suggests that the retail sales costs in a brick-and-mortar store are at least \$12 per transaction or higher, based on the store's cost structure, whereas online sales reduce the cost to \$2 per transaction⁸.

An important area of focus for the Government is enabling small businesses to participate in the digital economy in a secure and confident manner. The Government has developed resources that specifically support small businesses to adopt secure online practices. For example, a self-assessment tool for small business is available through the Stay Smart Online website. This helps small businesses to measure their online security knowledge and practices. In addition, the National E-Security Awareness Week, held 6–13 June 2008, included events that specifically focused on small business.

There are also examples of cooperative government and business partnerships in developing digital confidence. The Australian Internet Security Initiative consists of 56 ISPs that are working with the Government to help address the problem of infected computers on the Australian internet.

In addition to addressing general business concerns, there is a need to understand and address the concerns of key digital economy industry sectors—such as online retail, banking, employment, housing search and entertainment—that will attract Australians to participate in the digital economy.

⁷ Australian Bureau of Statistics (2008) 8166.0 *Summary of IT Use and Innovation in Australian Business 2006-07*. This percentage includes businesses with employment size 0–4 persons, 5–19 persons, and 20–199 persons.

⁸ <http://innovation.gc.ca/gol/innovation/site.nsf/en/in02272.html>

ACMA data⁹ indicates that users with broadband are more likely to conduct their banking online, to participate in online auctions, to buy airline tickets online and to stream and download audio and video. With the increase of broadband offerings, it is important that Australia's banking, retail, travel, entertainment and content industries are well-positioned to engage with consumers online. If not, broadband-enabled consumers may turn to overseas offerings and/or illegitimate offerings.

Evidence suggests that Australia's retail and content industries do not have as strong an online presence as their international counterparts. The level of e-commerce in Australia is estimated by some reports as half that conducted in the US. In addition, the content industry has significant concerns about the apparent extensive piracy of content on peer-to-peer networks.

While Government and industry can take measures to set a commercial and regulatory framework that promotes digital confidence, other challenges to digital confidence require enhancing Australia's digital and media literacy and promotion of e-security awareness and e-business skills among Australian industry.

Questions for industry and other stakeholders

What more can industry and other stakeholders do to address concerns about consumer privacy and online safety?

What more can be done to increase trust and confidence in online transactions?

What is needed to address the SME concerns identified above?

Are there possible barriers preventing a strong online retail experience in Australia?
What can industry and other stakeholders do to address these?

What is the experience of business-to-business e-commerce in Australian supply chains? Are companies (large and small) saving money because they are now making electronic transactions? What are the barriers to take-up? Are international companies benefiting from e-commerce transactions with consumers and with other businesses?

What evidence shows the possible barriers preventing greater online content offerings? What can be done to address these?

3. Developing Australia's knowledge and skills base

To enable full participation in the digital economy, it is essential that Australians have the appropriate digital and media literacy skills to access and effectively use digital media and communications. In particular, Australian businesses must have the necessary e-business skills. Expanding Australia's ICT skills base by promoting technology-focused training at the vocational and tertiary levels is important to ensure Australian businesses are able to develop the websites, applications and other products that are vital for their participation in the digital economy.

Digital and media literacy

Basic digital literacy skills include the technical skills and ability to engage at a basic level with a computer and the internet. These basic skills are a necessary step towards

⁹ Telecommunications Today, Report 6: Internet activity and content, September 2008 (p15): www.acma.gov.au/webwr/_assets/main/lib310210/report_6_telecommunications_today.pdf

more advanced digital media literacy (such as content creation in the form of blogs, webpages, online video, digital media) that are rapidly becoming standard forms of communication and information exchange. Digital literacy involves having the technical skills to operate a computer and access the internet and the ability to use basic software to create documents and emails.

Improved digital literacy will help Australians enjoy expanded opportunities for education, employment and social inclusion generally. It can also provide improved social and economic opportunities for people in rural, remote and economically-disadvantaged areas and facilitate the more effective delivery of public services, especially as these are increasingly provided online.

Media literacy is a step beyond digital literacy and refers to the ability to critically consume, comprehend and create media in all its modern forms—including broadcast media (television and radio) and digital media (computers, internet and mobile phones). Media literacy equips school children with the skills to effectively research online, builds consumer confidence enabling them to order and pay for goods and services online and gives people the capabilities to create their own diverse content and contribute to online communities such as forums and social networking sites. All of these are key elements for participating in the digital economy.

The Digital Education Revolution, a major part of the Australian Government's Education Revolution, is a vital step in developing the digital literacy of Australian students. The aim of the program is to contribute sustainable and meaningful change to teaching and learning in Australian schools that will prepare students for further education, training and to live and work in a digital world and participate in the digital economy. The program includes the provision of grants to schools for ICT equipment for secondary students, support for broadband connections to Australian schools, collaboration with states and territories to ensure teachers have access to training in the use of ICT to enrich student learning, and online tools and resources to support the national curriculum. By ensuring that our students have access to the necessary technology, infrastructure and skills, we are equipping the next generation of Australians with the tools, knowledge and experience necessary to engage online.

ACMA has initiated a Digital Media Literacy research program to inform the provision of consumer advice and protection measures by ACMA and by those organisations active in the promotion of media literacy across Australia. ACMA undertakes a range of community awareness programs and collaborates with other agencies to raise consumer awareness, including in relation to the internet.

Industry and the non-profit sector can also play a role in promoting media literacy to parents and children through organisations such as Young Media Australia and the Children's Television Foundation. In addition, the Australian Mobile Telecommunications Association promotes media literacy to children through its website to assist young people with the use of mobile phones, including issues such as bullying via mobile phones.

Media accessibility

The Government recognises barriers may presently exist to the full online participation by Australians with vision or hearing impairments. Consequently, the Government's Media Access Review is exploring strategies to help encourage and

facilitate access to electronic media (including digital media) by people with impaired hearing or vision.

On 30 April 2008, the Australian Government released a discussion paper as part of an investigation into access to electronic media by people with a hearing or vision impairment. Submissions are now closed, and over 160 submissions were received from representatives of the television, film and internet industries as well as from people with a hearing or vision impairment. The Government is carefully considering the issues raised in the submissions and has met with several stakeholders to further explore the issues raised. The final report of the investigation will be tabled in Parliament.

e-Business skills

e-Business skills are important for ensuring that Australian businesses are able to realise the productivity gains that the digital economy offers and the new markets it opens up. A well-designed website with e-commerce functionality is a good first step. However, Australian companies need appropriate skills and knowledge to maximise the potential for business in existing and emerging online environments. This may include optimising search techniques, developing online advertising strategies and knowing when and how to engage in new online ecosystems such as developing Facebook and iPhone applications.

With e-business skills, the potential benefits include: innovation, reduced product development costs, marketing and business process improvement, increased operational efficiencies, timeliness to market, and improved customer relations with business.

Developing an online presence potentially expands a company's marketplace from a local area to the world. Without taking any action, many Australian businesses are exposed to competition from distant companies with an attractive online presence and competitive offerings of goods and services. Recognising this, Austrade provides information via its blog¹⁰ on how industry can use new technology and Web 2.0 tools such as YouTube, RSS and blogs to reach new markets.

There is a demand for greater knowledge about e-business and this is an area in which a small amount of targeted effort can go a long way. A good example of this practice is the Tourism e-Kit¹¹, produced by the Australian Tourism Data Warehouse (ATDW), which is a series of 37 simple tutorials designed to equip tourism operators with effective knowledge about online marketing. According to the ATDW, there were over 10 000 downloads of the program within 14 days of launch.

The Australian Government has made commitments to facilitate the digital economy including the dedication of \$17 million over four years for the Creative Industries Innovation Centre under the Enterprise Connect program. The Centre will help SMEs in the creative industries to make a larger contribution to the Australian and global economy by providing professional advisory and related business development services to target SMEs across Australia.

¹⁰ www.austrade.gov.au/blogs/index.php/category/ebusiness/

¹¹ http://corporate.tourism.nsw.gov.au/Tourism_e-kit_p3313.aspx

Professional ICT skills

The ability of Australian businesses to compete in the digital economy requires the development of sufficient local ICT skills. Suitable training is also important for ensuring that Australians are able to secure jobs in the digital economy. However, there is an apparent shortage in skilled ICT employees.

The Government has conducted a six-monthly program of assessing ICT skill shortages since late 2000, primarily based on structured contacts with ICT recruitment professionals around Australia. Apart from the period between late 2002 and early 2005, when the ICT labour market was relatively depressed, this research has identified shortages in a number of distinct skill sets. Some of these assessed skill shortages are surprisingly persistent.

In its May to June 2008 assessment round, the Government concluded that national shortages existed in the monitored skills sets referred to as Oracle (database products), J2EE, C#/C++, .Net technologies, SAP, PeopleSoft, Siebel, Oracle E-business Suite, CISSP and GIS. Developed expertise in these technologies can prove relevant to several job roles—for example, Analyst/Programmers, Systems Analysts and Architects, Database Administrators and Business Analysts. This represented a softening in demand in the ICT labour market from the previous year. While shortages still exist, in most skills sets they have reduced. Several previously established shortages have dissipated in line with a distinct easing in the pace of demand growth. The downward trend in the demand for employees in the ICT sector is now well-established in the Government's ICT Skilled Vacancy Index and indicates that this softening in demand is likely to continue into 2009.

The skill shortages that the Government attempts to assess are for developed expertise in discrete ICT technologies. Typically, they represent skills demand that is not easily met by a new graduate. A minimum of several years of specific and relevant work experience is required by most employers in addition to professional qualifications. The co-existence of persistent skill shortages at this level with below average employment outcomes for ICT graduates over the period from 2005 to 2007 (the latest graduate destinations data available at present) may indicate a greater role for industry in developing the specific vocational skills needed in ICT graduates.

The Migration Occupations in Demand List (MODL) of 17 May 2008 also identifies those occupations and specialisations identified by the Government that are in short supply, namely CISSP, C++/C#/C, Data Warehousing, Java, J2EE, Linux, .Net technologies, Network Security, Oracle, PeopleSoft, SAP, SIEBEL, Solaris and Unix 12. In addition, the review of the Australian Government's e-security arrangements, recently completed, considered the ICT security skills gap.

The Games Developer Association of Australia has identified skills shortages in the areas of programming, art content creation and game design. Many studios have shortages of staff and often search overseas to fill positions, particularly senior

¹² www.skillsinfo.gov.au/skills/SkillsIssues/ICTSkills/ICTskills.htm#LabourMarket

positions. Currently, ABS data indicates that non-residents make up six per cent of Australia's digital games workforce.¹³

Through the ICT Centre of Excellence program, the Government is working to improve the delivery of ICT research training and education in Australia. National ICT Australia (NICTA), through which the program is delivered, has an enhanced PhD program to deliver this objective. NICTA has developed a common core curriculum for computer science and electrical engineering degrees that is delivered across its seven partner universities (ANU, UNSW, Sydney University, Melbourne University, Griffith University, Queensland University and QUT). In addition to developing broad technical expertise in their speciality, the PhD program has specialist components designed to develop the entrepreneurial and business skills of students, which are important for the commercialisation of basic research.

To assist with training Australians with the skills that digital economy companies will require, industry can provide input through the Government's Productivity Places Program (PPP), which provides for new training places in skills that employers need. The PPP is part of the Australian Government's Skilling Australia for the Future initiative, which involves more than \$2 billion in funding support and more than 700 000 new training places created over five years. An important part of implementing the PPP is determining priority areas, identifying skills gaps and forecasting what these are likely to be in the future.

Industry associations, with the assistance of Government, can also have a role in contributing to priority-setting and curriculum development for vocational ICT courses by advising Innovation and Business Skills Australia (IBSA) of their needs. IBSA is one of eleven Industry Skills Councils that work to improve the value of Vocational Education and Training, and are catalysts for effecting change in order to create a more skilled and equipped workforce in Australia. IBSA's responsibility is to advance its industry sectors through advocacy, networking, industry intelligence and workforce development.

IBSA uses this industry intelligence to develop and maintain nationally endorsed training packages in ICT. IBSA also supports the implementation of training through the development of support materials that respond to the needs of industry. For example, IBSA is engaging with the digital games industry, which has indicated that although there are many students in Australia currently enrolled in 'game design' courses, these are usually generalist courses and are not providing the industry with the higher understanding of specific skill areas they require. Industry feedback to curriculum development may assist in addressing some of the predictions of skills shortage.

Questions for industry and other stakeholders

What can industry and other stakeholders do to assist the Government's existing efforts to develop the digital and media literacy skills of Australians?

Would specific offline measures to inform business and local industry groups about online offerings assist in developing e-business?

¹³ ABS, 85150DO001_200607 Digital Game Development Services, Australia, 2006-07

How can industry assist in promoting the attractiveness of ICT related degrees?

What core set of digital economy skills can be incorporated into non ICT-related degrees?

Will industry work with Government through the Productivity Places Program and Innovation and Business Skills Australia to improve the curriculum of current training courses?

How can we better match supply and demand for skilled ICT workers?

What measures did industry find successful in boosting staff, ICT and e-business skills?

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

The Government appreciates that for Australia to maximise the benefits of the digital economy the regulatory frameworks within which industry operates need attuning with the current and future needs and practices of the online world and consistent with present and emerging international standards.

Online, market barriers and distance are reduced, which means that Australian companies are increasingly competing directly with foreign businesses, even if those same businesses are offshore and operating under different regulatory structures. In addition, some innovative companies that originate overseas but that are seeking to establish a presence in the Asia-Pacific region may compare, *inter alia*, the legal requirements of countries in the region to identify a suitable location that best meets their interests.

To allow Australian digital economy companies to flourish and attract the investment and knowledge transfer that overseas technology and online businesses can bring to Australia by establishing a local presence, it is important to consider those elements of our laws that are most critical for the digital economy and ensure that they are facilitative of online transactions and participation. As part of this, it is important to compare Australia's laws with international counterparts which have a healthy digital economy to ensure that Australia represents an attractive value proposition for digital economy companies. Clearly, relevant international treaties are also a key consideration.

The Government will continue to consider those aspects of Australia's regulatory frameworks that are most pertinent to the digital economy to identify whether reforms are necessary to promote and enable Australia's development as a knowledge economy. For example, on 10 November 2008, the Australian Government released a discussion paper on the proposal that Australia accede to the United Nations Convention on the Use of Electronic Communications in International Contracts. Amendments to Australia's electronic transactions regime are required before accession. The Government's intention is that Australia maximises the potential of technology to promote international legal and business engagement. Comments are sought by 30 January 2009.

Copyright 'Safe Harbours'

In recognition of the key role that ISPs play in providing access to the internet, Australia's copyright law contains certain so-called 'safe harbours' for some

activities. These were introduced as a result of the Australia–United States Free Trade Agreement (AUSFTA). The safe harbour scheme provides legal incentives for ‘carriage service providers’ to co-operate with copyright owners to deter unauthorised infringement of copyright material. The scheme applies to four categories of offending online activity. Broadly, these include providing facilities or services for transmitting, caching, storing at the direction of the user, and referring users to an online location using hyperlinks.

If a carriage service provider complies with the conditions of the scheme, the remedies that can be awarded against it for the infringing activities of its customers are limited (i.e. no monetary damages and a restriction on court orders). The conditions to be satisfied differ for each online activity. For some, there is a condition that the carriage service provider takedown infringing material.

The present scheme does not apply to all types of online service providers. That is, of the vast array of digital economy companies that offer such online activities, many do not qualify as a ‘carriage service provider’, which is defined by reference to the *Telecommunications Act 1997*.

Examples of online activities that may not be covered by the scheme include social networking sites and video sharing sites. Providing regulatory certainty to facilitate and encourage the operation of these sites in Australia may be beneficial because these platforms enable Australians to enhance their level of social engagement and are increasingly used in business contexts. ACMA’s recent *Telecommunications Today* report¹⁴ confirms that many Australians use the internet for the purpose of socialising and entertainment. Email is listed as one of the most important reasons for people to go online and sites such as Facebook, YouTube and MySpace are in the top 10 most popular websites for Australians. It is not clear whether the development of these new, primarily user-generated content platforms in Australia, which may host unauthorised content, is impeded by the scope of the present ‘safe harbour’ scheme.

Facilitating the development of these sites may be beneficial because they potentially represent new content distribution and political communications platforms for licensed content, in addition to allowing individuals to share their own content and stories. For example, all major Australian political parties established YouTube channels in the lead up to the 2007 federal election, many of the US presidential debates were posted to YouTube and many individual US voters posted videos of their voting experience to the video hosting site. In addition, both the European Union and the British Royal Family have YouTube channels.

Social networking sites also offer new distribution channels for content owners. Paramount Pictures recently unveiled a Facebook application that allows the sharing via the site of clips of movies such as *The Ten Commandments* and *Forrest Gump*. MySpace has also recently announced a deal with Viacom that will enable Viacom to commercialise clips of its content that are uploaded to the site by users.

¹⁴ Telecommunications Today, Report 6: Internet activity and content, September 2008:
www.acma.gov.au/webwr/_assets/main/lib310210/report_6_telecommunications_today.pdf

The scope of Australia's 'safe harbour' scheme could need examination to identify whether to encompass a larger range of online services that are important to the digital economy, consistent with our international obligations..

Appropriate flexibility for digital technologies

Copyright law recognises the need to provide adequate solutions to questions raised by technological developments in ways that maintain copyright as an economic incentive for creating and distributing new content and services while balancing the public interest in innovation in areas such education, research and information technologies.

In recent years, Australian copyright law has strengthened to confer new rights on copyright owners as well as more effective remedies to deal with digital piracy. At the same time, Australia's many exceptions to copyright were updated and extended, consistent with our international obligations. In 2006, following a broad-ranging review of copyright exceptions, new provisions were added to allow for consumer electronics devices. A new, flexible dealing exception was introduced to benefit educational institutions, libraries and archives and persons with a disability, including ways that are relevant for the online environment.

The Government acknowledges that there is an ongoing challenge to ensure copyright law is flexible and responsive to new technologies and business models, and to evolving, legitimate consumer expectations. Australia is actively participating internationally in dealing with these challenges, particularly in the work of the World Intellectual Property Organization on exceptions and limitations. Guidance of legislative change on new rights and exceptions in the online environment should desirably occur at the international level. However, reform within the present scope of international obligations can advance where there are clear problems to address.

For example, some technology companies suggest existing copyright law may not provide for particular internet services that are important for the digital economy. Practical solutions may also be required for user-generated content distributed through new forms of social communication and political expression, as is also considered by the European Union in its green paper *Copyright in the Knowledge Economy*.¹⁵

Maintaining technology-neutral legislation

There are several pieces of non-copyright legislation enacted at different times that affect the business of digital economy companies. These regulations, when passed, are based on an understanding of the then-current state of technology and e-commerce. Although legislation is drafted with a view to technology neutrality, the disruptive and generative nature of technology is such that it is often difficult to achieve neutrality for innovation that is not yet conceived. Unintended barriers may result for companies seeking to properly develop and maintain an online presence in Australia and, consequently, may cause a digital economy business uncertainty.

¹⁵ See p19, (available at: http://ec.europa.eu/internal_market/copyright/docs/copyright-info/greenpaper_en.pdf; last accessed 23 November 2008).

Questions for industry and other stakeholders

Should the existing copyright safe harbour scheme for carriage service providers be broadened?

Does Australia's copyright law unreasonably inhibit the operation of basic and important internet services? If so, what are the nature of such problems and practical consequences? How should these be overcome?

Is there non-copyright legislation that is directly relevant to digital economy businesses that create uncertainty or barriers?

5. Digital economy and the environment

The digital economy can assist government, industry and household efforts to reduce carbon emissions and change our systems and habits to be more environmentally responsible. A recent report estimated that the ICT sector could reduce global emissions by 7.8 Gigatonnes of carbon dioxide by 2020, or five times the greenhouse gas emission footprint of the sector by assisting mitigation efforts in other industries.¹⁶

The digital economy will increasingly include the use of ICT to mitigate climate change. However, government, industry and other stakeholders can take greater measures to promote more environmentally responsible practices in relation to the design and implementation of infrastructure and devices that enable the digital economy. For example, the ICT sector is responsible for approximately two per cent of global greenhouse gas emissions¹⁷, and ICT devices comprise an increasingly large proportion of the world's waste. The Government may also have a role to play in promoting greener ICT, as recognised by Sir Peter Gershon in the recent *Review of the Australian Government's Use of Information and Communication Technology*.

Teleworking and videoconferencing

Improved communications technologies, such as instant messaging and videoconferencing, reduce distances and barriers and allow people to communicate as effectively and efficiently as face-to-face communications. These new communications tools enable 'teleworking', which is described as an aspect of a broader trend towards 'dematerialisation' (the substitution of carbon-intensive activities with 'virtual' replacements). Replacing an international meeting with an international videoconference is one instance of dematerialisation.

Combined, all forms of domestic transport contribute nearly 14 per cent of Australia's greenhouse gas emissions with the majority from road transport¹⁸. Consequently,

¹⁶ SMART 2020: *Enabling the low carbon economy in the information age, Global e-Sustainability Initiative (GeSI)*, p 29. The authors of this report acknowledge uncertainty in their predictions due to unpredictable technology development and adoption. Current events make appropriate a further acknowledgment that uncertainty in global financial markets invalidates any long term economic prediction.

¹⁷ Gartner, 'Green IT: The New Industry Shockwave', presentation at ITXPO Conference, April 2007.

¹⁸ Department of Climate Change, Transport Sector Greenhouse Gas Emissions Projections 2007, Table 1.2 page 3

videoconferencing and teleworking are two promising technology applications for reducing greenhouse gas emissions by reducing the need for people to travel. The Australian division of global ICT giant Cisco, which develops videoconferencing products, achieved a reduction in air travel of 16 per cent in a single year after it adopted videoconferencing and other telepresence facilities.¹⁹

The technology for telework has existed for some time. Guidelines for implementing telework policies already exist and the practice is proven²⁰. The present challenge is to raise awareness of the possibilities of telework and break down cultural barriers to remote working. Videoconferencing technologies have also been available for some time, and, as technology continues to improve, it is anticipated that its use will increase.

Governments and industry need to more actively adopt and use telework and videoconferencing. A recent report by The Economist Intelligence Unit, based on a global survey of 345 senior executives from the private sector, noted slow adoption of telework despite the technology existing to achieve it.²¹ The *Sensis Insights Teleworking Report, June 2007*²² surveyed the use of teleworking in small-to-medium business in Australia and found that while 22 per cent reported the use of teleworking, they cited technical, administrative and supervisory issues as presenting barriers to greater adoption of telework.

Reducing the impact of digital economy devices and infrastructure

Each stage of the lifecycle of the devices and infrastructure that connect and enable the digital economy is increasingly considered from an environmental perspective. Energy efficiency requirements ensure that devices are 'greener' and increasingly have less adverse environmental impact during their life span. Product stewardship and e-waste policies can minimise the impact of a product at the end of its lifecycle.

With respect to the devices that enable the digital economy, the Council of Australian Governments (COAG) has agreed to develop a National Strategy for Energy Efficiency, to accelerate efforts across all governments and to help households and businesses prepare for the introduction of the Australian Government's Carbon Pollution Reduction.

COAG has agreed to develop national legislation for appliance energy performance standards (subject to completion of a regulation impact statement) as part of the National Strategy for Energy Efficiency. Standards will be supported by labelling to simplify enforcement and ensure consistency. This will reduce transaction costs for business and accelerate the rollout of new standards and labels for products.

¹⁹ Reported in *Towards a High-Bandwidth, Low Carbon Future*, p 46.

²⁰ Case studies and other information about teleworking are available at www.teleworkaustralia.net.au/resources/cases/australia/ and www.innovation.gov.au/Industry/InformationandCommunicationsTechnologiesICT/Pages/Teleworkingusingtechnologytochangewhereandwhenwework.aspx

²¹ Economist Intelligence Unit, 'Managing the company's carbon footprint' February 2008.

²²

www.innovation.gov.au/Industry/InformationandCommunicationsTechnologiesICT/Documents/SensisTeleworkingJuly2007.pdf

Proposals are being developed to introduce mandatory performance requirements across the broad range of ICT equipment that facilitates the delivery of digital economy services. The Department of the Environment, Water, Heritage and the Arts is currently negotiating with computer and monitor suppliers to develop agreed regulatory standards for those products.

With respect to key infrastructure that enables the digital economy, data centres are energy-intensive installations and savings are possible both in the power used to run the computer equipment and the equipment used to keep the data centre cool.

Without intervention, experts suggest energy consumption will continue past trends and double every five years. In the US, energy and infrastructure costs associated with data centres now exceed capital costs. In order to reverse this trend, consultants were commissioned to explore measures that could address this in Australia, and ultimately to regulate data centre equipment on efficiency grounds (equipment, such as servers, storage devices and specialist air conditioners). Industry and government will commence negotiations on data centre efficiency in 2009.

To better inform industry about how to promote energy efficiency in data centres, the Green Grid is a global consortium that publishes reports and technical documents containing methods for improving data centre performance.

Product stewardship and e-waste

Product stewardship is a ‘cradle to cradle’ tool that helps reduce the environmental impact of manufactured products. Under product stewardship schemes, producers, brand owners, importers, retailers, consumers and other parties accept responsibility for the environmental effects of their products—from the time they are produced until the time of disposal. Product stewardship can assist in minimising e-waste. E-waste is a term used to describe waste consumer electrical and electronic equipment and is a continuing and growing problem given the increasing proliferation of ICT devices and shortening product life cycles.

E-waste is one of the fastest growing categories of waste, currently growing at more than three times the rate of general waste. Devices such as televisions, computers, mobile phones and printers contain many different substances including some of which are harmful if released into the environment such as lead, cadmium and mercury. The increasingly rapid obsolescence of ICT devices also has a significant environmental impact. In 1992 the average life of a computer was 4.5 years. This has dropped to around two years.²³ Mobile telephones have an average life of between six months and two years.²⁴ In Australia, most of these discarded devices currently end up in landfill.

The Australian Government is also working on potential solutions to the e-waste problem with state and territory governments through the Environment Protection and Heritage Council (EPHC). Australia’s environment ministers have acknowledged the need for national action on e-waste and are exploring possible options—such as recycling schemes, for managing end-of-life televisions and computers. The television

²³ Dr Maxine Cooper, Commissioner for Sustainability and the Environment, ‘E-Waste Think Tank Review and Synthesis’, May–June 2008, p 5.

²⁴ www.Mobilemuster.org.au

and computer industries, through Product Stewardship Australia and the Australian Information Industry Association, are working with governments to develop specific proposals.

While there is currently no national regulation in Australia in relation to product stewardship for e-waste, governments are cooperating with industry on the best way to proceed with e-waste regulation in Australia. E-waste is subject to a ban or levy in some local government areas.

The Australian Government is also working on e-waste strategies with state and territory governments through the Environment Protection and Heritage Council (EPHC). At the 17th meeting of the EPHC in November 2008 Australia's environment ministers agreed to commence developing a national waste policy and policies on product stewardship and e-waste. The Australian Government is also working with key industry stakeholders, on behalf of EPHC, to identify the best way of phasing out certain hazardous materials from electrical and electronic goods, consistent with the EU Restriction of Hazardous Substances Directive.²⁵

Another important international initiative relating to e-waste is the Global e-Sustainability (GeSI) and Electronic Industry Citizenship Coalition (EICC) industry pilot. Amongst other initiatives, this pilot introduces a common auditing methodology for assessing suppliers, supply chain accountability tools, and other resources for reducing e-waste. A large number of international ICT firms have signed on to the pilot.

The Minister for the Environment, Heritage and the Arts, Mr Peter Garrett AM MP, stated recently that 'the Australian Government and Environment Protection and Heritage Council are actively working with industry on a range of product stewardship options.'²⁶

Smart technologies for more efficient scarce resource usage

Two of the largest sources of global emissions are transport and power generation. The use of smart technologies is considered one of the more accessible options for addressing climate change by making emissions-rich activities more efficient and managing scarce resources more effectively. Technology can also assist in monitoring both scarce resources and important infrastructure.

Smart technologies such as radio-frequency identification (RFID) and intelligent transport systems can assist in reducing the emissions from transport and logistics of physical goods. RFID systems can contribute to achieving savings in supply chain energy use by optimising transport, supply and even manufacture. RFID systems have already demonstrated improvements in supply chain efficiency in Australia—for example the National Electronic Product Code Demonstrator Project that in 2006 demonstrated supply-chain productivity gains of over 20 per cent. RFID deployments normally comprise systems for tracking inventory and movement of goods and systems for real-time optimisation of the transport aspect of supply chains.

²⁵ A preliminary environmental and economic assessment was released in August 2007 and is available at www.environment.gov.au/settlements/waste/electricals/index.html

²⁶ Interview in the Epoch Times, quoted in Elizabeth Noble, 'E-Waste Think Tank Review and Synthesis', May-June 2008, p 22.

Intelligent transport systems (ITS) are another very visible deployment of ICT for reducing energy consumption. These systems provide real-time data about aspects of the transport network and its operations, allowing continual optimisation of the network for energy efficiency and to identify and correct potential problems before major consequences emerge. Systems for optimising traffic flow and minimising greenhouse gas emissions are already deployed in Australia. For example, industry developments and implementations of ITS include NICTA's Smart Traffic and Roads project, involving the NSW Roads and Traffic Authority, which aims to make traffic control systems smarter by increasing the amount of traffic information collected, or sensed, by the system. In Western Australia, Rio Tinto plans to fully automate its iron ore transport operations in the Pilbara.

For online goods transfers, Next Generation Networks (NGNs) are packet-based networks that carry fixed, mobile and broadcast traffic in a unified system. International standards bodies such as the International Telecommunication Union are already working on building efficiency measures into NGN standards. Experts have predicted a 30–40 per cent improvement in efficiency over present networks.²⁷

ICT can also be deployed in commercial buildings and in the homes to use energy more efficiently. An often discussed example is that of stand-by power—many devices continue to use power even when not in use. In the home, the remote capabilities of ICT can turn on devices in anticipation of the resident's return to the home, rather than leaving those devices operating continuously in the resident's absence. ICT can also turn off devices not in use, such as a television left on or a hot water system that need not operate. This is termed 'presence-based power.'

Monitoring energy use and managing demand could assist in addressing climate change. Australian, state and territory government energy Ministers at the 15th Meeting of the Ministerial Council on Energy on 13 June 2008 agreed on a national framework for the roll-out of 'smart meters'. These can provide major benefits for consumers, empowering them to take control of their energy bills by providing better information, new choices in off-peak pricing to save money, and new services to manage appliances and increase their energy efficiency.

Smart meters are electronic utility meters for measuring use of gas, water and, in particular, electricity. Smart meters provide improved functionality over the mechanical meters currently deployed—to qualify as 'smart', the meter must communicate with the electricity supplier's grid infrastructure in some way. Smart electricity meters are currently being deployed in Victoria, with preparatory work for a nationwide roll-out currently conducted by the Ministerial Council for Energy.²⁸ No detailed specification was made about the types of smart meters for deployment, so they may vary by jurisdiction from basic to more advanced versions. However, state-of-the-art smart meters include features such as continuous measurement, time-of-day pricing information, and two-way communication between the device and the energy provider enabling providers to read and control features of the meter remotely. A separate user interface can enable communication between the smart meter and

²⁷ Ericsson, BT, Dittberger Associates, 'Sustainable energy use in Mobile Communications', August 2007, quoted in Romero, TSB, submission to ITU Focus Group on ICT and Climate Change, September 2008.

²⁸ Ministerial Council on Energy, Information Paper on Smart Meters, January 2007, p 5.

electrical devices within the home, resulting in more efficient energy use. Widespread deployment of smart meters is expected to lead to a significant overall reduction in the amount of energy used by Australian households.

Smart meter functionality will enable energy-efficient cycling²⁹ of energy-intensive appliances such as air conditioners without affecting comfort levels in the dwelling. By regulating the use of an air conditioner's air compressor, consumers will benefit from reduced energy use at times when energy costs are highest, enabling consumers to save electricity.

A practical demonstration of the use of smart meters is taking place as part of the Australian Government's Solar Cities Program which is trialing energy options to provide information on how to manage energy into the future, reduce greenhouse gases and protect the environment. This program is a partnership that involves all levels of Government, the private sector and local communities. The Solar Cities are Adelaide, Townsville, Blacktown, Alice Springs, Central Victoria, Perth and Coburg. When fully operational, the projects will involve the use of more than 20 000 smart meters.

'Smart infrastructure' is capable of monitoring or responding automatically to changing circumstances. Smart electricity grids are a prominent example of smart infrastructure. In parallel with government efforts, industry groups are contributing to the smart grid deployment effort. Smart Grid Australia is promoting a high-technology system involving automatic meter management, remote sensing, monitoring and control systems and real-time analysis of network data. Smart Grid Australia is a consortium of telecommunications and power industry firms, equipment manufacturers and investors.

Other potential examples of smart infrastructure could involve physical infrastructure with an additional data acquisition and monitoring capability. This is already incorporated as a matter of course in infrastructure such as dams, water supply, rail, mass transit and could potentially be incorporated in other newly developed infrastructure.

Questions for industry and other stakeholders

What, steps, if any, should Government take to promote the greater adoption of teleworking and videoconferencing? What impact do Operational Health and Safety laws have on the uptake of teleworking and videoconferencing in your industry?

The Government has already committed to review and propose regulation for e-waste and has taken steps to promote smart technology to manage scarce resources. Are there additional steps Government can take on these issues? What additional steps can industry take in relation to these issues?

²⁹ Cycling involves switching off the cooling for a group of air conditioners (or other devices requiring high levels of electricity) for a short period when electricity infrastructure is near peak capacity. When the air conditioning resumes another group of air conditioners elsewhere is switched off for a short period and so on until the cycle commences again with the first group of air conditioners.

6. Measuring the digital economy and its Impacts

Developing and maintaining a strong evidentiary base is a critical aid in guiding digital economy investments and initiatives of governments and the private sector. Digital economy benchmarking can assist government, industry and other stakeholders identify potential problem areas. Metrics can assist in identifying opportunities and barriers and contribute to the development of targeted solutions where necessary. For individual businesses, metrics can assist in tracking investment performance relative to competitors.

The National Innovation System review³⁰ recommended that the collection of data and development of metrics to support evidence-based policy development, monitoring and evaluation can facilitate favourable conditions for the development and use of new and emerging technologies. It also recommended adequate resources for the ABS to ensure the longevity and international consistency of innovation data collections and their availability to facilitate effective policy development. The Government is currently preparing its response to these recommendations.

The ABS collects a range of data related to the digital economy, as identified in Table 2.

Table 2 Range of digital economy data collected by the ABS

Data source
Census
Household Use of IT (HUIT)
Children's Participation in Culture and Leisure Survey
Business Use of IT (BUIIT) and associated Integrated Business Characteristics survey (IBCS)
Farm Use of IT(FUIT)
ICT Industry Survey
Internet Activity Survey
Government Use of IT (GUIT)

These datasets, together with some non-government and other government datasets (such the National Cybercrime Survey), may aid in tracking the take-up of the internet and changes in how the internet is used by businesses and consumers.

However, as the internet use becomes more universal, some existing metrics become less useful. For example, a measure like the percentage of businesses that use internet access, or that place or receive orders online, becomes less useful as diffusion approaches 100 per cent of the ultimate market.

³⁰ www.innovation.gov.au/innovationreview/Documents/NIS-review-web.pdf

Future policy issues are arguably less about the availability of access to high speed broadband internet and more about the innovative use associated with transformation and automation of existing practices through, for example, Web 2.0 and Web 3.0, mobile solutions and new business models. In addition, the indicators suggest that there is considerable scope for additional investment in e-business solutions by Australian business. However, the available indicators provide limited detail on sector-level performance, and particularly in comparison to our international competitors. Yet, without such indicators, it will be difficult to identify industries or sectors that are lagging and to which appropriate policy responses, if any, could be directed.

Recently, industry has released useful research that provides assistance with tracking contributors to the digital economy. Examples include the Australian Industry Group's recent *High Speed to Broadband: Measuring industry demand for a world class service*, the Australian Interactive Media Industry Association's *Digital Services Index 2008* and the Interactive Entertainment Association of Australia's *Interactive Australia 2009* report.

Questions for industry and other stakeholder

What, if any, additional datasets should government collect to improve the benchmarking of Australia's digital economy?

What do you consider are the key digital economy indicators?

What additional industry sources of data exist which provide background on digital economy metrics?

What additional research and data work could industry or data collection organisations undertake to assist in measuring Australia's digital economy?

Do you have views on the adequacy of the existing data sets or suggestions as to how they might be improved?

GLOSSARY

Blog	A website that displays in chronological order the postings of one or more individuals and usually has links to comments on specific postings.
Carriage service provider	For the purposes of the <i>Telecommunications Act 1997</i> : if a person supplies, or proposes to supply, a listed carriage service to the public using (a) a network unit owned by one or more carriers; or (b) a network unit in relation to which a nominated carrier declaration is in force, that person is a carriage service provider ³¹ .
Creative Commons	Creative Commons is a non-profit that provides a suite of licenses that allow a copyright owner to pre-authorise certain uses of their work by members of the public.
Cyber-safety	The protection of internet users, especially children, against online dangers and threats such as cyber bullying or harassment.
Digital identity management	Management of identity of a person or an object across various digital platforms.
Downloading	The process of copying one or more files from an online source (e.g. a website) to one's own device (e.g. PC, mobile phone).
Dynamically-created maps	A dynamic digital map is a stand-alone Web-enabled and browser independent program that displays and links maps, images, movies, data and text—such as map explanations and field trip guides ³² .
E-Security	E-Security aims to maintain confidence and trust in the online environment. Key aspects are the confidentiality, integrity and availability of information systems - ensuring that only authorised people or organisations can access particular material, that the material has not been altered during transmission and that the systems responsible for delivering the information are accessible as needed, by those who need them.

³¹ *Telecommunications Act 1997*

³² <http://ddm.geo.umass.edu/>

Facebook	A social networking site that allows members to share messages, photos, links and videos.
Flickr	An online photo management and sharing website.
Geo-location data	Data capturing a range of details about an internet user (geographical location, domain name, internet service provider).
Geo-tagging	Adding geographical information to content on the web such as images or videos.
Global positioning system (GPS)	A fully functional global navigation satellite system that enables receivers to determine their speed, time and direction.
Greenhouse gas emission footprint	The amount of carbon dioxide (measured in units) generated by any particular human activity.
Instant messaging	A real-time conversation with typed text that involves two or more people and is conducted over connected devices such as mobiles or computers over a network.
Intelligent Transport Systems (ITS)	ITS refers to the utilisation of ICT to better manage routes, vehicles and other transport infrastructure.
Internet browser	An application that resides on a user's computer and enables them to view pages on the world wide web.
iPhone	An internet enabled smartphone offered by Apple Inc. Users can connect to a 3G mobile network and also browse the internet using Safari.
ISP filtering	Internet content filtering that is conducted at the internet service provider level.
Location based services	Services offered to mobile devices based on their geographical position. These include applications such parcel tracking, weather services and event information.
ManyEyes	A tool developed by IBM that allows the visualisation of data in various formats.
Mashups	Websites or applications that combine content from one or more sources.
Microsoft Internet Explorer	An internet browser developed by Microsoft, usually included with Windows operating systems.
Mozilla Firefox	An open source internet browser developed by the not-for-profit Mozilla Foundation.

MySpace	A social networking site on which users create a profile, which may include photos, a blog, music and/or video files. Other MySpace members can view profiles and post comments on another member's forum.
NASA	National Aeronautics and Space Administration. An agency of the United States Government.
No known copyright Identifier	A term used in the photo sharing site Flickr, which indicates that the author of the content has not placed any known restrictions on the use of their work without attribution or permission.
OECD	Organisation for Economic Co-operation and Development.
Peer-to-peer applications (P2P)	Application files not stored on a central server, but exchanged directly between users.
PolicyMap	An online service that allows users to create reports about a specific location.
Pure play internet companies	Pure play internet companies are only involved in the distribution of content online and are not involved in infrastructure services (such as communication networks) that enable the internet.
Radio-frequency identification (RFID)	A set of identification technologies that use electronic readers to extract data from tags attached to objects. RFID tags are used to track and manage cattle, protect valuable goods in supermarkets, and identify objects in transit such as pallets.
Real Simple Syndication (RSS)	A protocol that makes it easy for computer users to receive content from their favourite providers whenever the content is updated. The flow of content the user receives is called an 'RSS feed'.
Safari	A browser that is available on Apple's platforms such as Macintosh computers and the iPhone.
Safe harbour provisions	Provisions that reduce or remove a party's legal liability provided that the party acted in good faith.
Server-based filtering system	In internet filtering, server-based filtering systems work at the internet service provider level in contrast to personal filters that work at the user level.
Social media	A term used to describe Web-based tools that harness the power of collaboration and social interaction (e.g. Second Life, MySpace).
Spatial information	Location-specific information of an object in space.

Streaming	Streaming media is multimedia that is constantly received by, and normally displayed to, the end-user while it is delivered by the provider. The name refers to the delivery method of the medium rather than to the medium itself.
Swivel	A website that allows users to generate graphs and images based on data that is publicly available.
Teleworking	ICT-enabled work undertaken where the location of the activity is independent of the location of the employer.
Uploading	Online activity of posting content such as text, images or videos by a user from their computer on to the internet.
Videoconferencing	Refers to a conference that is conducted with two or more people involving the use of audio and video equipment to establish a virtual presence. The conference is generally conducted over a communications network such as the internet.
YouTube	An online video sharing service.
Web 2.0 technologies	Web 2.0 (also referred to as ‘Participative Web’) is a term used to describe a set of next-generation internet technologies. These technologies and tools make it easier to create Web-based applications that behave dynamically and are highly social, encouraging users to manipulate and interact with content in new ways.
Web 3.0 technologies	Web 3.0 technologies refer to the eventual transformation of the web from Web 2.0. It includes speculations about the possibilities of the technologies that will dwell in the next phase of the evolution of the internet.
Web-based mapping system	A mapping system that utilizes spatial data to offer an interactive mapping service through a web based application.