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Australia

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INTRODUCTION

At a time when many liberal democracies are facing currencies in relative decline, reducing interest rates and gearing up for recession, Australia continues to hope to survive the downturn with what has been termed the 'two-track' economy. This economy features high growth in the mining and raw materials industries and marginal growth in other sectors. Queensland and Western Australia in particular are the beneficiaries of this dynamic. Unemployment in general is low, and there is a shortage of skilled people, including tradespeople, nursing and medical staff and teachers. Less skilled and unemployed Australians are most disadvantaged by the boom since they face rising rents, food and fuel prices particularly in the boom states.

Australia's wealth is based on its exports particularly to growing markets in Southeast Asia and India, but it also has a thriving knowledge economy that is highly dependent on ICT. The growing value of the Australian currency is making knowledge and information services, such as education and consultancy, more expensive to customers overseas. Aware that other markets are emerging in the information sectors, that the resources boom is staggering and might collapse, and that global fears about climate change might bring that day forward, Australians are searching for ways to build sustainable industries of benefit to the nation and to the region.

While the economic fortunes of Australia have been comparatively stable due to its mineral deposits, the political landscape changed significantly at the end of 2007. At that point the Howard government, a coalition of conservative parties, ended 11 years of rule, handing over to Kevin Rudd's Labor government. The first act of the Rudd government on 3 December 2007

Total population	21,097,100 (September 2008 est.) ^a
GDP	USD 766.8 billion (2007 est., PPP) ^b
Key economic sectors by contribution to GDP	Services: 70.7%, industry: 25.6%, agriculture: 3.7% (2007 est.) ^b
Computers per 100 inhabitants	79 (2006 est.) ^c
Fixed-line telephones per 100 inhabitants	55 (2007) ^d
Mobile phone subscribers per 100 inhabitants	107 (2007) ^d
Internet users per 100 inhabitants	80 (2007) ^e
Domain names registered under .au	914,771 (2007; excluding .gov.au) ^d
Broadband subscribers per 100 inhabitants	25 (December 2007) ^f
Internet domestic bandwidth	up to 24 Mbps (depending upon exchange and telco)
Internet international bandwidth	365 Gbps (actual)/1,560 Gbps (potential) (2006) ^g

(Sources: ^aABS 2008a; ^bCIA 2008; ^cComputer Industry Almanac 2007; ^dACMA 2008; ^eNielsen Online 2008; ^fABS 2008b; ^gTIAC 2006)

was to ratify the Kyoto Protocol on Climate Change, 10 years after it had been agreed internationally. This was a symbolic statement of change because the Howard government, although a signatory, had refused to ratify and implement the Kyoto Protocol. There was a further break with the past on the first sitting day of the new Parliament. On 13 February 2008, Prime Minister Rudd delivered a National Apology to the Stolen Generations of Australia's Aboriginal and Torres Straits Islander peoples. The phrase 'Stolen Generations' refers to government policies across a century or more (until the 1970s in some places) of removing indigenous children from their parents and bringing them up in missions and institutions. The children were frequently trained for work in the wider society as domestic and household servants. Aboriginal and Torres Straits Islander people had requested the apology, but the Howard government had refused to make it.

In addition to their commitment to environmental responsibility and social justice, the Labor government has promised major initiatives in high-speed broadband and an 'education revolution' (including a laptop for all school children between 9 and 12 years of age), and it called for a 2020 summit to bring together Australians with different perspectives and from different backgrounds to reflect upon the kind of nation they would like to have in a decade's time, and how to get there.

Australia is the world's largest island, and the only island continent. On 21 April 2008 the United Nations responded to a 2004 claim and recognized Australia's extended boundaries in line with its continental shelf. This made a huge impact in terms of overall area: some 2.5 million additional square kilometres of the sea bed immediately became Australian territory. Given its

size, Australia has a comparatively small population. This is partly because so much of the land cannot be used for agriculture or settlement. Additionally, the country is still suffering from the worst drought on record and most population centres continue to restrict the use of water, especially for gardens and recreational purposes.

Australia is highly urbanized with the vast majority of the population living in cities. Only 3 percent of the population is defined as settled in remote areas. Also, 80 percent of Australians live within 50 kilometres of the sea (Dale 2006). One of the implications of this unbalanced spread of the population is that it is particularly difficult and expensive to connect the few people living in remote areas to good quality digital services, and thus there is a significant digital divide although Australia is a comparatively wealthy country. The Howard government set up an AUD 2 billion (USD 1.35 billion) Communications Fund to support improved telecommunications in the bush, and they paid for this through the sale of Telstra, the national telecommunications carrier. This fund has now been earmarked for general improvements to deliver high-speed broadband to approximately 98 percent of the population, leaving aside the very people for whom the fund was created.

TECHNOLOGY INFRASTRUCTURE

Although Australians think they have good technological infrastructure, it stops well short of the fibre-to-the-home (FTTH) network that would be required for a full range of fibre-based digital interactivity at world class speeds. The Labor Party, then in opposition (2007), argued that at AUD 4.7 billion their fibre-to-the-node (FTTN) plan was the ‘most expensive election pledge’ ever. The implication is that it is too expensive to connect all Australian homes by fibre. Nevertheless, some consumers are hoping for greater speed and service and they suggest that FTTN may be a first step toward FTTH, even if this further advance is only feasible in Australia’s towns and cities.

Critics have suggested that the promised speeds are disappointing and that the plan’s integrity has been compromised by the use of statistics and scenarios generated by Telstra. Previously the publicly-owned monopoly telecommunications provider, Telstra is now fully privatized although a government-regulated entity, known as the Future Fund, set up to support the cost of pensions for Australia’s aging population, still holds a 17 percent share. The proposed plan is a revisitation of older partnership plans whereby private companies would provide the infrastructure to the populous areas and the government funding would make feasible the rollout of services to most regional, remote, and rural communities. The intention is to cover 98 percent of Australian businesses and homes with broadband

speeds of at least 12 Mbps, and use the Future Fund to finance over half of the AUD 4.7 billion in government funding. Two entities are fighting for the rights to partner the government in this endeavour. Telstra was first to propose a partnership arrangement but it withdrew its initial offer arguing that the competition regime under which they would be required to offer their competitors access to the network put them at a market disadvantage. The opposition is an Optus-led consortium, Telstra’s major competitors that have banded together to develop a nationally competitive proposal to match Telstra as the giant in the market. Ultimately, the Telstra bid was eliminated on a technicality and the rollout has been delayed indefinitely (see ‘ICT and the November 2007 Federal Election’).¹

KEY INSTITUTIONS AND ORGANIZATIONS DEALING WITH ICT

In December 2007, a fortnight after the defeat of the conservative Howard coalition government, the national Department of Communication, Information Technology and the Arts (DCITA) was subsumed within the Department of Broadband, Communications and the Digital Economy (<http://www.dbcde.gov.au/>). This move signalled two major messages: first, that broadband is of primary importance to the government; and second, that the digital economy would have a major new focus. (At the same time, the Arts portfolio was transferred to the Department of Environment, Water, Heritage, and the Arts.) DBCDE (the new shorthand for the Department of Broadband, Communications and the Digital Economy) is responsible for government services (information, regulation, policy, statistics, research, reviews, security, contacts, etc.), communications and technology, and media and broadcasting. Representing Australia in international policy and decision-making forums concerning the national interest in terms of broadband and the digital economy, DBCDE collaborates with the Department of Foreign Affairs and Trade (DFAT) when it comes to exports and access to foreign markets.

The Australian Government Information Management Office (AGIMO, <http://www.agimo.gov.au/>), which is part of the Department of Finance and Deregulation, is charged with ensuring that Australia uses ICT to improve government administration. Its website includes a ‘Better Practice Centre’ that showcases particularly effective initiatives, and celebrates case studies of finalists in the ‘Excellence in e-Government Awards’. The range of publications available for free download includes *Responsive government: A new service agenda* (AGIMO 2006), which looks forward to 2010 and has four key focus areas: meeting users’ needs; establishing connected service delivery;

ICT and the November 2007 Federal Election

Where previous federal election campaigns had been conducted primarily through the traditional media of print and broadcast, in 2007 the Internet played a significant role in the election media mix. Parties, candidates, and media organizations used the Internet to engage citizens in interactive exchanges. Voters also took the opportunity to make their voices heard more loudly, particularly with the help of a progressive new voice in Australian politics, GetUp (<http://www.getup.org.au/>), an independent, grassroots community advocating Australian citizen involvement in and holding politicians accountable on important issues. *YouTube* reached a new prominence as a site for the conservative Liberal party to release short ‘address to the nation’-style video clips featuring then Prime Minister John Howard (see Bruns et al. 2007). With both party leaders packing their punches on *YouTube*, the wags commented that it would be good when all Australia had the broadband speeds necessary to watch them.

Australian mainstream media became obsessed with electoral polling data. In response, a number of high-profile psephology blogs and websites emerged (operated by scientists specializing in the analysis of electoral opinion data). These bloggers’ consistent critiquing of mainstream news media coverage in general, and of the political analysis in leading national newspaper *The Australian* in particular, ultimately resulted in a thundering (and ill-advised) editorial denouncing the citizen psephologists as ‘out of touch with ordinary views’ and culminating in the remarkable claim that unlike them, ‘we understand Newspoll because we own it’ (*The Australian* 2007).

Youdecide2007.org (YD07) was a project that harnessed and encouraged citizen involvement in media and election debates. It was funded by the Australian Research Council and involved public service broadcaster SBS, Cisco Systems and the National Forum (which publishes the political commentary site *On Line Opinion*). YD07 developed a hyper-local citizen journalism² coverage of the election by encouraging users to report political activities in their own electorate. It managed to provide coverage ranging across electorates as diverse as the inner-Brisbane seat of Griffith, won by incoming Prime Minister Rudd, and the remote Western Australian seat of Kalgoorlie, stretching across much of the state and (by size, not by residents) the largest single electorate in the world.

User-led political news sites such as YD07 overcome what is often highlighted as a shortcoming of citizen journalism: they explicitly encourage their contributors to become active as journalists rather than simply as commentators. Indeed, one story emerging from a YD07 interview with the Liberal member for Herbert — who had claimed that many ‘young people today are financially illiterate’ — became the basis for a question in Parliament by then-opposition leader Rudd during the last sitting weeks before the election, and helped spark a national debate about the personal credit crisis in Australia (Wilson 2007). While there were some unresolved issues, YD07 points to a role for citizen-driven, bottom-up media forms in the emerging overall media mix of Australia as a networked society.

(Sources: Bruns et al. 2007; *The Australian* 2007; Wilson 2007)

achieving value for money; and enhancing public service capability. There has also been ongoing discussion and publications about environment-friendly ICT since 2004.

Although there has been a major change in terms of the names and composition of government ministries, most of the regulatory authorities are legislated to be at arm’s length from government itself. The regulatory authorities tend not to change with the government. Set up by statute, the regulators are appointed for a fixed term and are considered for renewal or replacement at the end of that term. The major government regulator in the ICT field is the Australian Communications and Media Authority (ACMA, <http://www.acma.gov.au/>). The ACMA website offers a portal to information and regulation concerning broadcasting, the Internet, the radio frequency spectrum

and telecommunications. There are links to popular government initiatives to crack down on spam and to register private telephone numbers as ‘do not call’ lines, which prevents telemarketers from calling those numbers. ACMA also regulates radio, television and Internet content, and deals with complaints.

The Classification Board which classifies films, videos, games and some literature is separate from ACMA, and has only recently taken over from the Office of Film and Literature Classification (OFLC) set up in 1988. The Classification Board (<http://www.classification.gov.au/>) is also an independent statutory body. The Classification Board is supported by the Classification Operations Branch in the Attorney-General’s Department so it is not independent in the sense that it is entirely constituted as a stand-alone entity. Appeals against a Classification Board ruling

are referred to the Classification Review Board, also supported by the Attorney-General's Department.

ICT AND ICT-RELATED INDUSTRIES

Although Australia is an importer of many high-tech goods, including ICT, it has a vibrant industry in high-end, value added and service-driven products. The ICT industry in Australia is worth AUD 90 billion (AIIA 2008), 4.6 percent of Australia's GDP (AIIA 2008; ACS n.d.) and 13.8 percent of total investment in Australia (ACS n.d.). The ICT sector employed 274,132 people in mid-2005 (ABS 2006). Foreign-owned companies account for 43 percent of employment and 60 percent of income (ACS n.d.). AIIA is one of the major industry organizations and its members are aligned with over 500 companies and account for AUD 40 billion in ICT revenues. AIIA International affiliates include the Asian-Oceania Computing Industry Organisation, the World IT and Services Alliance, and the Asia Pacific ICT Alliance (with links through their regional award programs).

The other industry association for this market sector used to be the Australian Electrical and Electronic Manufacturers' Association (AEEMA), but at the start of 2008 AEEMA merged with the Australian Industry Group (AIG). Together, the AIG plus AEEMA market focus comprises: 'communications, connected homes, data capture, defence, digital broadcasting, electrical capture equipment, electronics (including components and micro-electronics), hazardous area equipment, home appliances and accessories, IT security, lighting, photonics, smart cards and transport telematics' (AIG 2008).

Not all ICT-related industries are legitimate. A priority for the new Minister for Trade is to follow the lead of Japan, the EU, Switzerland, and the US in the negotiation of an Anti-Counterfeiting Trade Agreement. This commitment arises out of a 2007 discussion paper and will address issues around pirated intellectual property, particularly in digital products such as games, music, films, and software. Estimating that the global value in physically traded pirated and counterfeit goods could have amounted to USD 200 billion in 2005, the government discussion paper adds that 'if domestic production and trade in infringing goods and digital piracy via the Internet were also to be included, the OECD report estimates the total value would be increased by several hundred billion US dollars' (DFAT 2007).

The Interactive Entertainment Association of Australia (IEAA) has published a recent report on 'Interactive Australia 2007: Facts About the Australian Computer and Video Game Industry' (IEAA 2007). Among other findings from over 1,600 randomly sampled telephone interviews and an online survey run by AC Nielsen Surveys Australia, results showed that 41 percent

of Australian gamers are female, 8 percent are seniors, and 79 percent of Australian households have a specialist device for video and computer gaming (IEAA 2007, p. 1), with many parents attributing a number of positive outcomes to their children's interactive game-playing, including learning about technology and maths and developing their capacity to plan ahead.

KEY ICT POLICIES, THRUSTS, AND PROGRAMS

In addition to the ICT promises made by the government in the Education Revolution policy (discussed in 'ICT-related Education and Capacity-building Programs', the Department for Education, Employment, and Workplace Relations (DEEWR, previously the Department for Education, Science and Training) maintains a searchable database of national and state-level ICT policies for education and training (DEST 2007). An outcome of the *Strategic Framework for the Information Economy* (DBCDE 2004), the database provides easy access to all current and recent (in the last 10 years or so) ICT initiatives related to education and the workforce.

The dual commitments by the new government to tackle FTTN infrastructure on the one hand and computer access for high school students on the other (see 'ICT-related Education and Capacity-building Programs'), constitute a policy pincer movement aiming for an increase in the speed and capacity of data transfer for almost all Australians and extensive exposure to ICT skills and education for the next generation of workers.

LEGAL AND REGULATORY ENVIRONMENT FOR ICT DEVELOPMENT

Funded by the federal DEEWR and its pre-election predecessors, the Open Access to Knowledge (OAK) Law Project (<http://www.oaklaw.qut.edu.au/>) hosted at Queensland University of Technology is a national leader in the field of Open Access policy development. It 'aims to ensure that every day citizens through to top-end researchers can legally and efficiently share knowledge across domains and across the world' (OAK Law Project 2008). It has already developed legal protocols to achieve that aim. In February 2008, it launched the OAKList (<http://www.oaklist.qut.edu.au/>), a '[W]eb-enabled database containing information about publishing agreements and publishers' open access policies' (OAKList 2008).

Creative Commons Australia (<http://www.creativecommons.org.au/>) is a related project to translate international Creative

Commons (CC) licence agreements into the Australian legal framework. At present, CC licence version 2.5 is already available in Australian variants and a draft of CCau v3.0 underwent public consultation in 2008. Additionally, Creative Commons Australia is increasingly involved in information and outreach projects in the wider Asia Pacific region.

Child protection is a major theme in Australian Internet regulation although opinion is divided between teaching children how and why to behave safely on the Internet — and how to respond to any troubling material that they may encounter — and filtering out all content that might be deemed unsuitable. Both strategies are in use. Additionally, there are Cyberpredator laws in some jurisdictions, such as in Western Australia, where specialist police officers pose as underage Internet users to catch people using the Internet to stalk or exploit Australian youngsters. Cyberpredators can be prosecuted if they are operating from within Australia. ACMA’s online resources for adults monitoring children and their Internet use can be found at <http://www.cybersmartkids.com.au/for-grown-ups.htm>.

DIGITAL CONTENT

Because English is Australia’s official language, there are few problems with digital resources for the majority of the population. However, there are few digital resources available in indigenous languages and the languages spoken by migrant groups.

Some websites are available in indigenous languages. One website, <http://ninti.ngapartji.org/>, includes a pay-to-learn program where mother tongue Ngapartji speakers work with professionals to provide resources for others to learn this indigenous Australian language. The Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS, <http://www.aiatsis.gov.au/>) is a government body under the DEEWR tasked with providing accessible resources on indigenous culture and society, including resources relating to lost and endangered languages.³

The Department of Immigration and Citizenship’s website (<http://www.dimia.gov.au/living-in-australia/help-with-english/index.htm>) includes a ‘Living in Australia’ section with booklets (also available on the Web) in 24 community languages, and it provides details about interpreting and translating services available to refugees and new migrants. SBS Radio (<http://www.radio.sbs.com.au/>) broadcasts in 68 languages — more than any other broadcaster anywhere in the world. Special Broadcasting Services (SBS) also broadcasts a range of linguistically and culturally diverse television programming, and has a strong online presence.

ONLINE SERVICES

Online services in Australia are generally well developed. All major banks and businesses, and many minor businesses, offer online services of some form, including Internet banking, browsing and ordering facilities; feedback and support mechanisms; and many other service options. Trust in such services is generally high with over half of Australian Internet users subscribing to online banking since as far back as 2005 (DCITA 2005). Indeed, many major banks have reduced their network of physical bank branches in favour of online banking and other financial services. This strategy gives rise to equity issues for Australians who are unwilling or unable to switch to online service offerings.

Australian governments at all levels (local, state, and federal) have also made moves toward online services ranging from static or dynamic information sites to e-service and e-business options. Policymakers and service providers are exploring the potential for direct engagement with citizens that incorporates elements of Web 2.0 and social networking sites. For example, Future Melbourne was a project that utilized wiki technology to develop a vision for the city in the year 2020 in consultation with citizens (Future Melbourne 2008). Just-in-time delivery of information to phones and other mobile devices (e.g. weather information, traffic conditions) is also being adopted, as well as citizen reporting via short message service (SMS) or multimedia message system (MMS) to local authorities concerning potholes, graffiti, traffic accidents, and other incidents.

At their most basic, e-government sites act simply as a repository for government information, policy documents, press releases, and other content to be communicated to the public. Beyond this, government websites and Internet services offer opportunities to search for or request specific information; pay fees and fines; and provide feedback to department staff. Shortly before the November 2007 federal election, AGIMO released a discussion paper on the potential for creating an Australian federal government consultation blog that lists consultations and allows people to post responses, comments, and feedback. Although not a ‘blog’ as conventionally understood, such a consultation site could facilitate continuous conversation between citizens and government. The AGIMO paper also outlines some of the key challenges (of moderation, privacy, and security) associated with such a project.⁴ A DBCDE trial *Digital Economy* blog took place in late 2008.

In this context it is also interesting to note that one of the key recommendations from the April 2008 ‘2020 Summit’ of Australian thinkers, entrepreneurs, artists, and policymakers was the creation of a ‘one-stop shop’ portal to government services (at the federal level), provisionally titled www.your.gov.au.

Although the Summit’s recommendations are not necessarily representative of wider public interest or binding for the federal government,⁵ a central government services portal is likely to be viewed as a desirable initiative by a large proportion of the population.

ICT-RELATED EDUCATION AND CAPACITY-BUILDING PROGRAMS

Building ICT capacity is a high priority for the Australian government, and one of the key election promises in the new government’s ‘Education Revolution’ policy was to provide a dedicated school computer for every child enrolled at an Australian secondary school (years 9–12, ages 14–17). This initiative is to be funded by a ‘National Secondary School Computer Fund’. The policy also promises broadband or equivalent connections for all Australian schools. The policy document explicitly states that ‘Australia must accept the fact that computer technology is no longer just a key subject to learn, it is now the key to learning in almost every subject’ (ALP 2007).

Not all projects target the young. Several recent projects have focused especially on regional and remote areas, or on specific socio-economic, ethnic or age groups. *edgeX.org.au* focuses on the regional Queensland city of Ipswich, near Brisbane; it aims to build ICT, Web 2.0 and social networking capacities among resident groups, from school-age children to seniors (Bruns and Humphreys 2007). Such projects have the dual aim of helping participants develop functional digital literacies and building their capacities for active, productive, and socially embedded participation in the knowledge economy.

Due to its recent strong economic performance, Australia is currently experiencing a period of prolonged skills shortages across a number of areas but especially in the trades (e.g. there is a shortage of electricians and plumbers). There has also been a marked reduction in enrolments in information technology (IT) disciplines and a downsizing of IT departments at many universities and technical and further education (TAFE) colleges. Some people argue that this apparent decline in enrolments is a disguised fragmentation of the IT market, with students enrolling instead in such courses as 3D design, online gaming and culture, and interactive multimedia, rather than in traditional (IT) degrees. Multidisciplinary and hybrid offerings reflect other changes in the Australian economy and a gradual evolution of economic policy favouring the service, knowledge, and creative industries. These developments support combining IT skills with

disciplinary knowledge in design, business, law, and the creative industries. Australia’s continuing transition to a knowledge economy and network society is also reflected at other levels of the Australian education system. However, the industry is concerned about a future skills shortage (see ‘Australia’s Unhappy ICT Workforce’).

OPEN SOURCE AND OPEN CONTENT

Open and reliable access to information is an increasingly important issue in Australian policy debates. State and national libraries and archives have been exploring questions surrounding open access to government information and documentary resources of national significance for several years. These have been complemented recently by projects examining and developing the relevant legal frameworks to ensure citizen access to important information (see ‘Legal and Regulatory Environment’ in this chapter).

It is not yet clear how far Australian governments will go with respect to a possibly broader uptake of open access and creative commons principles in their everyday operation and policy, and of open source software as an underlying technology for government services. The new government highlighted the need for citizen access to information and knowledge during its time in opposition, but such ideas have yet to be translated into concrete government policy.

Access to data and code and transparent and accountable handling of information are also seen to be linked directly with the use of open source software for processing, storing, and accessing information. This is increasingly highlighted in the area of health-related information and electronic health records (EHR). For example, Australian researchers and developers are involved in the Open Health Tools community, ‘an ecosystem that brings together members from the health and IT professions to create a common health interoperability framework, exemplary tools and reference applications to support health information interoperability’ and which involves the federal government organization Health Services Australia (Open Health Tools 2008). Another project is the *openEHR* project (<http://www.openehr.org/>) operated by University College London and Ocean Informatics Ltd. Australia, which aims to ‘enabl[e] ICT to effectively support healthcare, medical research and related areas’ (*openEHR* 2007). However, these projects are at a relatively early stage of conceptual and technological development, and significant take-up in everyday practical application remains to be seen.

Australia's Unhappy ICT Workforce

At the start of 2008, Ms Sheryle Moon, CEO of the Australian Information Industry Association, warned that the biggest threat to the sustainability of Australia's ICT sector is not so much the 1.52 percent of Australian carbon emissions attributable to the industry, but a pressing and increasing shortage of relevant skills: 'falling ICT student enrolments, an

increasingly competitive labour market, and the imminent retirement of the baby boomer generation' (Moon 2008). Attributing part of the problem to a brain-drain, Moon argued that sustainable organizations 'must move beyond environmental and efficiency concerns to embrace the challenge of changing workforce demographics'. With ICT workers reportedly suffering from job stress and poor management, which cause absenteeism and staff turnover (what Australians call 'churn'), Moon suggested that employers need to 'transform the nature of industry workplaces to address these problems'. Moon called upon Australia's ICT industry to develop new ideas that would align industry values with the values of the workforce and change workplaces for the better to reduce separations, encourage training and recruitment, and persuade older workers to continue in their jobs.

This is not the first time that problems with the ICT industry as a place to work have been identified. Citing Australian Bureau of Statistics data from 2005, the Australian Computer Society notes that 95 percent of businesses are small, employing fewer than 20 people, with a predominantly male workforce. Overall, 68 percent of the workforce and 79 percent of professional and technical staff is male (ACS n.d.). In the wider ICT-related industry there were 371,150 employees recorded in mid-2006, with the proportion of male workers rising to 84.5 percent (Government of Western Australia 2007, p. xvii) and those under 30 years old accounting for 27.7 percent (ACS n.d.). In addition to the gender imbalance, a recent report found that parents have a 'reticent or suspicious attitude toward the industry due to the perceived vulnerability of the sector following the "dot com" crash'. They also saw an IT career as being for "geeks", and as being a boring and high risk career with limited financial reward' (Government of Western Australia 2007, p. xxiii).

Given the long and generally unsuccessful attempt to recruit more female students to ICT courses in Australian universities, it will be a particularly critical issue if the industry also loses its attraction for its disproportionately young, male workforce.

(Sources: ACS n.d.; Government of Western Australia 2007; Moon 2008)

ICT RESEARCH AND DEVELOPMENT

Australian-based researchers continue to work closely with colleagues and government and non-government organizations in other Asia Pacific nations to explore the ICT for Development field. Ethnographic action research methodologies (Tacchi et al. 2003) pioneered by Australian-based researchers have been especially important in engaging with local communities in India, Nepal, Sri Lanka, Indonesia, and elsewhere, in collaboration with community multimedia centres that provide local people with ICT skills and enable them to communicate their own views and ideas.

In contrast, research within (and mainly directed at) the Australian context focuses more on the future development of advanced information and communication technology and services, and their contribution to the economy and society. The establishment of the Smart Services CRC in early 2008 builds on this agenda. The Cooperative Research Centre, an AUD 120 million project supported by the Australian Research

Council and several Australian universities and industry partners, demonstrates the continuing shift in research and policy emphasis from technology to services. In particular, the Cooperative Research Centre will investigate the impact of the increase in user-led content creation, social media, and Web 2.0 practices on government, business, and other forms of service delivery.

CHALLENGES AND OPPORTUNITIES

The shift to services points to a continuing need to build advanced ICT literacies and capacities in the general Australian population, to avoid a widening of digital divides in the community and to enable all Australian citizens to participate effectively and successfully in future socially networked digital environments. Over time, these developments are also likely to be exported to other parts of the region.

It is likely that Australia's researchers and practitioners will continue to engage most closely with their nearest and

most populous neighbour, Indonesia. There have been recent improvements in what has at times been a difficult relationship. On the other hand, China looms large as a major partner in trade and intellectual exchange, especially following the Beijing Olympics and given that Australia's prime minister is a fluent speaker of Mandarin.

Beyond trade itself, a key aspect of any regional exchange has to do with Australia's role as an important exporter of tertiary education to the region. A significant percentage of students at Australian universities are international students from the Asia Pacific. Gradually the emphasis of international education is shifting from undergraduate to postgraduate qualifications. But the trade in international student education is threatened by the strong performance of the Australian dollar and the otherwise gloomy outlook for the overall world economy, which might combine to limit the ability of prospective international students to finance study at an Australian university. But this may be addressed through the increased development by Australian universities of campuses in the students' countries of origin.

Finally, the increasingly strongly felt limitations of the domestic Australian ICT infrastructure, especially the relatively poor value-for-cost ratio of the Australian consumer broadband network, may hinder further development of ICT research and practice in the country. While the new federal government made improvements to consumer broadband one of its central campaign promises, the present intractable situation in the domestic ISP market with the hostility between Telstra and its rival Optus-led consortium may cause significant delays in the realization of such promises.

NOTES

1. ZDNet.com.au carries up to date news on Australian technology issues.
2. Hyper-local journalism projects aim for news coverage at a community level, at and below the level of entire cities and towns. Such projects aim to fill a gap in coverage that is common in mainstream news media, which usually do not have the resources or inclination to cover events below international and national levels.
3. All but 20 or so of the over 200 indigenous languages are judged to be endangered.
4. Related projects, such as the UK government's e-petition site (<http://petitions.pm.gov.uk/>), appear to have had mixed fortunes so far (Virkar 2007).
5. The summit is an unelected body without formal influence on policy decisions.

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