Australia's Demographic Challenges

Introduction

Globally, economies are being transformed by the pace of information dissemination and transfer. This transformation is impacting on society at all levels resulting in changes to the workplace, the necessary skill base and service provision. At the same time, significant demographic challenges are being encountered as a result of the ageing of the world's population. This is resulting in fundamental changes to the demographics of the workforce while concurrently there is a need for a higher skill base, flexibility and adaptability within that workforce.

The Information Economy Division of the Department of Communication, Information Technology and the Arts (DCITA) would like to respond to the discussion paper *Australia's Demographic Challenges*, released by the Federal Treasurer on 25 February 2004, by placing the changing demographics in the broader context of the transition to an information economy.

In particular the key policy areas identified in the Treasury paper which require consideration of the information economy in relation to changing demographics are as follows:

1. The need for current and future workers to update their skill levels to meet technological change (foundation skills);
2. The importance of higher skills and educational levels in the creation of knowledge, ideas, and technological innovation;
3. Workplace and workforce flexibility, adaptability and the use of ICT;
4. The impact of information and communication technology on the health sector.

This response will take the form of providing a summary of the main comments followed by a more detailed discussion of the relevant areas. The detailed discussion begins with a broader contextual background which will set the foundation and raise some key concerns for consideration. Subsequently, each of the above policy areas will be addressed.

Summary
In summary, DCITA's main comments are that:

- Additional research is required to identify the micro economic or sectoral impacts of the ageing population and the potential for addressing the negative impacts of population change at the sectoral level;

- Due to the ongoing transformation to an Information Economy, basic ICT skills should be recognised as a foundation skill alongside literacy and numeracy;
- There is a need to encourage and support basic ICT skill development through a range of strategies including flexibility in training options, raising awareness of the benefits and providing incentives to employers and employees;
- Basic ICT skills together with broadband services expand the opportunity for continued training, education and upgrading of skills through the formal and non formal education sector in a flexible and accessible manner;
- Teleworking can provide range of benefits to employees which are likely to encourage continued participation in the work force and to employers through cost savings and employee retention; and,
- Broadband services make possible a range of options to improve service provision and increase efficiencies in the health sector.

Background

In its *Intergenerational Report*[1] the Commonwealth Government identified Australia's aging population as a significant issue for future economic and social well-being, emphasising the need for long-term policy planning to address the expected negative impacts of these changes in a timely and effective manner.

> *'Although the aging of the Australian population is not expected to have a major impact on the Commonwealth's budget for at least another 15 years, forward planning for these developments is important, to ensure that governments will be well placed to meet emerging policy challenges in a timely and effective manner. By maintaining sustainable government finances, the Government avoids compromising the wellbeing of future generations by the activities of the current generation'.*[2]

While the dynamics and impacts of an aging population are complex, the primary concerns relating to population change in Australia, beyond the next two decades, has tended to focus on the macroeconomic impacts of increasing dependency ratios and declining labour force participation levels. To date, very little research has been undertaken to identify the micro economic or sectoral impacts of an ageing population, current sources of productivity growth and their potential for addressing the negatives impacts of population change at the sectoral level.

DCITA believes that the economy-wide application of Information and Communication Technologies (ICT) has underpinned productivity growth in Australia and is a major driver of organisational, product and service innovation[3]. The Government's *Backing Australia's Ability* statement also identified the relationship between ICT and innovation as underpinning future economical and social development in Australia. Therefore, any future discussion of the impacts of

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[1] 2002-03 Budget Paper No. 5, 14 May 2002
[2] http://www.budget.gov.au/2002-03/bp5/html/02_BP5Overview.html#P23_3643
[3] *Productivity Growth in Australian manufacturing* NOIE Occasional Economic Paper 19/3/04, Productivity and Organisational Transformation: optimising investment in ICT, NOIE, February 2003.

population change in Australia should examine the role of the information economy in addressing the challenges of an ageing population, particularly in relation to issues such as the role of ICT in:

- Facilitating increased labour productivity to meet the challenges of reduced labour force participation and resulting labour shortages;
- Delivering an ongoing efficiency dividend to government via the development of a comprehensive online service regime geared to the demands of a broad population base;
- Supporting the extension of critical service delivery in areas of health and education;
- Facilitating firm level and organisational innovation; and
- Facilitating community and social cohesion.

Fundamentally, ICT proficiency is about everyone having the ability and subsequently the choice to participate in the information economy and take advantage of its economic and social benefits. For this to happen it is essential that all adults have an awareness of the benefits of ICT skills and have the opportunity to access to training to develop their skills. This is considered a core issue in relation to the information economy which can also be seen to present particular challenges in relation to various demographic target groups. Therefore this theme is returned to in a separate section.

DCITA is currently co-ordinating the development of a new *Strategic Framework for the Information Economy*, due for release in 2004. This will specify the need for strategies to:
- Develop capabilities, networks and tools to facilitate participation in the information economy of people living in regional communities, and also of other people facing economic or social barriers to participation;
- Develop collaboration and capabilities in nonprofit organisations and SMEs to facilitate their participation in the information economy; and,
- Promote broadband infrastructure, content, capabilities, networks, tools and service investment in regional areas.

Given this broader background, DCITA presents the following comments and observations against four key areas in relation to *Australia's Demographic Challenges*.

1. **The need for current and future workers to update their skill levels to meet technological change (foundation skills)**

It is widely accepted that investment in human capital and skills development is aligned with national economic viability. Low levels of literacy in significant areas of the population are likely to have a negative impact on the economy, society and individual well-being. In addition, due to the shift to the information economy, basic skills in the use of ICT can be seen to be a foundation skill, along with literacy and numeracy, in the building of a strong work force and social fabric. For older adults this presents a significant challenge as many have not had the opportunity to develop skills in this area. While the application of ICT skills to life and work is likely to be

different based on employment participation, a lack of foundation skill in this area will impact on economic development and quality of life at both the micro and macro levels.

Satya Brink, in the paper *Digital Divide or Digital Dividend? Ensuring Benefits to Seniors from Information Technology[4],* discusses how using information technology is becoming a normal pattern of life and a way of doing things which she defines as "e-life". She attributes this to information technology being linked to work, wealth creation, citizenship and social relationships constituting an information society. She also sees synergies between the access to technology and its use with the consumption of goods and services, the standard of living and quality of life.

Individuals need to be information literate in order to undertake the challenges of engaging in the information economy. Changes to the way people do their shopping, pay accounts, do their banking, make reservations, study, acquire information or communicate with others means that without these skills they are at risk of being economically and socially marginalised.

In the workforce ICT skill divisions are apparent, most particularly between those in high-skilled and low-skilled occupations, and the unemployed. There are few specific programs (other than the BITES program) to assist unemployed people improve their ICT skills. Under current arrangements, Job Network providers are paid primarily on an outcomes basis for job seekers' return to work but there is no stipulation about the skill levels or long-term sustainability of such work or providing basic ICT skilling as a component of their employability. Therefore there is a need for continued policy and program development to address the ICT skill needs of people in low-skilled jobs, the unemployed and those outside of the workforce and formal education systems.

The recent UK Department for Education and Skills (DfES) White Paper, *21st Century Skills, Realising our Potential[5]* outlines the need for ICT to become embedded in adult learning (similar to literacy and numeracy) and makes a commitment to help all adults in the UK gain ICT skills as a third skill for life alongside literacy and numeracy. The aim is to promote ICT literacy as an essential element in the individual's quality of life, their employability, job mobility and participation in society.

In recognition of ICT skills as a foundation skill, the ABS have proposed a survey into adult literacy which includes collecting information about ICT use and self-assessment of ICT skills[6]. This will not be conducted until 2006-2007. Some State Governments have however, commissioned their own research into the ICT literacy needs of their citizens. For example, the West Australian Department of Education

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[4] Brink, S. (2001) "Digital Divide or Digital Dividend? Ensuring Benefits to Seniors from Information Technology", *Writings in Gerontology*, 17: Seniors and Technology, Canada, p. 23
[5] Dept for Education and Skills (UK) (2003) White Paper 21st Century Skills: Realising our potential, http://www.dfes.gov.uk/skillstrategy
[6] ABS (2003) Education and Training Statisitics National Centre: Proposed Survey on Adult Literacy, http://www.abs.gov.au/websitedbs/c311215.nsf/0/7c289ec152a16969ca256c6e00767921?OpenDocument

and Training commissioned a study[7] into computer literacy and found that 35 per cent of adults surveyed had little or no ICT skills/familiarity.

Skill Development

There are several distinct issues which need to be identified in relation to skill development. One problem that has occurred over time is a lack of distinction and definition around related but separate skills development issues. These are identified as defining and developing basic ICT skills, appropriate training methods for particular target groups and the use of ICT for basic skill development.

In defining basic ICT skills there is an important distinction to be drawn between being an effective user of the hardware (the PC, in particular keyboard and mouse), the software (communications software such as e-mail) and in accessing and making effective use of online information and services (effective Internet use).

Effective Internet use also includes information literacy which refers to the ability to critically appraise the value and veracity of information. Wagner and Kozma[8] note that whilst these skills are becoming increasingly important in society they are not taught as a part of formal schooling or non-formal literacy programs.

A key challenge to the development of ICT foundation skills will be to engage individuals in the process of learning. In order to address this challenge, barriers which inhibit their return to learning will need to be considered and appropriate training programs designed and provided. A lack of confidence in their ability to learn and fear of using ICT are some of the major barriers facing adults as they return to education and training after a long absence from formal education systems. Recognition of prior learning, including recognition of inherent skills is an important consideration in training programs as older people frequently have skills that can be transferred to new training. This may be particularly relevant for older workers who have used older technologies.

In support of this, the Senate Employment, Workplace Relations and Education References Committee's report *Bridging the skills divide[9]* recommended that:

> "The Commonwealth provide funding to enable mature workers who are unemployed or at risk of being retrenched, to have a formal Recognition of Prior Learning, career counselling and access to training to develop new skill sets which will enhance their future employment prospects."

However, training programs that are offered are often inappropriate to the older learner in terms of pace, learning style and method. Research has shown that one to one training and small discrete training groups were identified as the preferred

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[7] WA Dept of Education and Training, (2001) *Bridging the Digital Divide in Western Australia.* http://www.training.wa.gov.au/resources/docs/bdd.pdf
[8] Wagner, D & Kozma, R., *New Technologies for Literacy and Adult Education: A Global Perspective,* an opening session supplemental paper presented at the NCAL/OECD International Roundtable 12-14 November 2003, Philadelphia, Pennsylvania
[9] Senate Employment, Workplace Relations and Education References Committee (2003) Bridging the Divide. http://www.aph.gov.au/senate/committee/eet_ctte/skills/report

training delivery options for older people[10]. To engage older workers it may be necessary to modify training methodologies in the workplace or alternatively to make provision for workers to meet their foundation skill needs outside of the workplace. The non-formal education sector may be a viable option as programs are often provided in a more informal setting, removed from workplace issues, and more adaptable to individual learning needs.

Adult and Community Education (ACE) plays a significant role in delivering basic ICT courses to people across the community and may be a key resource for training older workers. However, it also continues to face its own major ICT challenges in terms of access to adequate bandwidth and ICT support, and the availability of PCs and bandwidth for individual student use. A study commissioned by the Flexible Learning Framework, identified the bandwidth challenges for the VET sector[11]. The study noted the very low bandwidths of the ACE providers, with around half of the ACE providers surveyed using dial-up modems (maximum of 56 kb/s). Until these challenges are met, the ACE sector capacity for more flexible learning delivery to the community is likely to remain severely limited.

One approach currently being promoted by the UK Government to improve the ICT skills and learning of the workforce is through *Home Computing Initiatives* (*HCI*)[12] which encourages employers to make computers available to their employees for home use. This is supported by the UK Government's tax exemption on loaned computers. Salary sacrifice is also used as a mechanism for employees obtaining home based computers.

Current Australian tax arrangements however do not generally encourage such an approach, as laptop computers provided by employers to employees are exempt from Fringe Benefit Tax (FBT) but PCs are not. If an employer provides a PC to an employee, the employer has to pay FBT calculated on the value of the benefit (i.e the "fringe benefit" (or the value of the use of the PC to the employee for personal activities) to the employee).

The third area of consideration and one of the greatest potentials of ICT is the application of this to other learning. Research indicates that adults undertaking training need it to be flexible and appropriate to their needs. ICT provides a range of flexibilities in mode, time and place of education and training. Research undertaken by Wagner and Kozma[13] define ICT as a productive technology and a delivery tool that can support the acquisition and use of basic skills needed to read and write text.

In order to meet the needs of the changing demographics, many of the Australian universities and TAFEs are offering a range of courses to assist in re-training and up-

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[10] WA Dept of Education and Training (2001) *Bridging the Digital Divide in Western Australia.* http://www.training .wa.gov.au/resources/docs/bdd.pdf

[11] Australian National Training Authority (2002) Bandwidth Connectivity: Strategies for the VET Sector, http://www.flexiblelearning.net.au/accessbandwidth/A2B4C_Final_Report.pdf

[12] http://www.knowledgenetwork.gov.uk/oec/hci.nsf/

[13] Wagner, D & Kozma, R., *New Technologies for Literacy and Adult Education: A Global Perspective,* an opening session supplemental paper presented at the NCAL/OECD International Roundtable 12-14 November 2003, Philadelphia, Pennsylvania http://www.literacyonline.org/products/wagner_kozma.pdf

skilling. These courses are offered in a range of mediums with flexible access. For example, software currently in use by a number of Australian universities: Unilinc is Web-ezy software and includes eight modules addressing a particular information skill such as Internet searching. Modules are customised for individualised clients, are Australian designed and fully supported.

2. The importance of higher skills and educational levels in the creation of knowledge, ideas and technological innovation.

The importance of high level skills cannot be understated in terms of building a strong economic base. The OECD notes that:

> Adult learning has taken on a much higher profile in the last decade, as OECD economies and ageing societies are increasingly knowledge-based. High unemployment rates among the unskilled, the increased and recognised importance of human capital for economic growth – together with public interest in improving social and personal development – make it necessary to increase learning opportunities for adults within the wider context of lifelong learning. There are a range of learning opportunities which may be related to employment, to the need for basic skills or upskilling, or may respond to social and civil preoccupations. At the same time however, there are strong inequities in terms of access and provision. [14]

The Senate Employment, Workplace Relations and Education References Committee's report *Bridging the Skills Divide* acknowledges that a strong skill base will provide further opportunities for learning:

> "Reskilling is a key strategy for many skill shortage areas, both for meeting emerging skill needs and in providing lifelong learning opportunities for an ageing workforce."[15]

If ICT skills are incorporated as a foundation skill alongside basic literacy and numeracy, the opportunity for increased access to further education is possible for a greater number of people. ICT skills are now essential to education as the use of PCs and Network Computers within the sector increases. Networked systems are now used for almost every aspect of education including enrolment and administration, communication between and with students and staff, library collections and remote library resources and the delivery of content. The pervasiveness of ICT in the education sector is supported and encouraged by Broadband access.

One of the major benefits of ICT, and broadband in particular, in education is the opportunity that it provides for remote content delivery. With a greater number of accredited and award courses available via Web-based education, the scope for up-skilling is enormous. Web-based education offers flexibility and variation in the

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[14] OECD (2003) *Beyond Rhetoric: Adult Learning Policies and Practices,* OECD, Paris. http://www.oecd.org/dataoecd/18/57/18466358.pdf

[15] Senate Employment, Workplace Relations and Education References Committee. (2003) Bridging the skills divide. http://www.aph.gov.au/senate/committee/eet_ctte/skills/report

mode of delivery (e.g. print, videolinks, synchronous and asynchronous communication) and in the constraints of time, place and distance.

Flexibility in content delivery allows for courses to be moulded to the needs of the students in much more cost effective manner. The combination of audio, visual and print can provide a more varied and effective teaching program. Students can be supported through both synchronous and asynchronous communication as required.

A much wider variety of courses and programs can be accessed as place based limitations are removed. Individuals can access courses anywhere within Australia or overseas which is of particular value in specialised fields where training opportunities are limited. This can provide potential savings to both employees and employers in terms of travel and time while at the same time providing access to higher level skills.

The benefits afforded by web-based education are likely to increase participation in education and training by removing the restrictions of time, place and distance. This is of particular benefit to people in rural and remote Australia, people with disabilities and those with family/caring and/or work commitments.

Overall, there is greater scope for employers to support further education due to the flexibility of both work arrangements and educational access. Promoting a culture and a practice of continuous learning in the workplace can enable individuals to progress through their careers and building a comfortable standard of living. Training provides workers with increased promotional opportunities, improved job security and higher wages.

3. Work place and workforce flexibility, adaptability and the use of ICT

It is becoming more important for the workforce to be flexible, adaptable and technologically adept. At the same time it is increasingly necessary for the workplace to become more adaptable to the needs of the worker. The World Summit on the Information Society highlighted ICT literacy as an essential element in its *Declaration of Principles and Plan of Action*, released at the first WSIS Summit in Geneva in December 2003:

> "Awareness and literacy in ICTs are an essential foundation for employability and help people benefit from the new opportunities offered by ICTs for traditional jobs, self-employment and new professions."[16]

These opportunities provided by ICTs include increased flexibility and choices in working arrangements for both workers and employers. Millions of people around the world are now able to perform their jobs without actually going to a traditional place of work. Instead of commuting to an office, staff can 'telework' by working from home, at a nearby 'satellite' centre or from a virtual office on the road that comprises a laptop with an Internet connection. Some people choose to telework full-time, others a few days a week or on an occasional basis. This is an especially important

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[16] WSIS (2003) Declaration of Principles, Geneva. http://www.itu.int/dms_pub/itu-s/md/03-WSIS-DOC-0004!!MSW-E.doc

consideration for those workers who have a disability, who are older, indigenous, rural and remote and those with family responsibilities.

The Australian Government NOIE publication *BROADBAND Teleworking*[17] outlines some of these flexibilities of the workplace as providing opportunities to overcome distance and allowing people to perform their jobs without actually going to the traditional place of work.

The benefits of teleworking are evident on a micro and macro level, for governments, businesses, institutions, communities and individuals. Telework enhances opportunities for the self-employed, allows people to find a better work-life balance and provides new hope for those with disabilities. Telework can help to build sustainable economies with many environmental benefits. Having staff work from home can reduce energy consumption, traffic congestion, infrastructure costs and urban consolidation. Teleworking can also lead to higher productivity gains for businesses and the wider economy.

A high speed internet connection makes teleworking a realistic option for a range of people. With a broadband connection it is possible to transfer large files over the Internet. Broadband connectivity also makes it possible to run real time interactive applications such as videoconferencing to keep in touch with clients and colleagues wherever they may be located. Broadband can be provided through a range of technology, with at least one option available to all Australians (satellite). Connections can be through existing phone infrastructure with a form of Digital Subscriber Line technology, through the cable network which is usually used to deliver pay TV, through wireless solutions, private company networks or via satellite.

Business benefits

Offering staff flexible work practices or a work-lifestyle balance increases an organisation's chances of attracting and keeping high calibre employees and alleviating the costs of staff turnover. Absenteeism can be reduced, morale improved and service enhanced because staff members save commuting time. They can be 'at work' earlier, remain later or work outside hours when circumstances demand.

This means organisations can be more flexible to client needs and make themselves more competitive. With people teleworking it is possible for even a small company to have representatives in distant locations serving local markets, without enormous office overheads, but with access to all the same information and the instant communication that is necessary to be effective.

Employee benefits

The money saved from not having to travel, purchase meals or buy clothes can be redirected. The stresses of commuting and office politics are reduced, resulting in less illness and absenteeism – an enormous cost to the economy. For those with families

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[17] NOIE (2003) BROADBAND Teleworking
http://www.dcita.gov.au/ie/publications/2003/10/broadband/teleworking

or caring responsibilities an improved life/work balance can be achieved and continuing participation in the workforce more likely.

According to the Federal Department of Employment and Workplace Relations, a growing number of Australian organisations provide teleworking arrangements for employees. These include Alcoa, American Express, AMP, CSIRO, Esso, Lend Lease, National Australia Bank, Queensland Rail, Rothmans Australia, Sydney Water, Telstra, University of Western Australia and Westpac, to name just some.

Government

The Australian Government has convened an ICT Support for Flexible Work Practices IDC. The major focus of the IDC is to identify, encourage and share teleworking best practice across Government.

A Home-Based Telework Programs Working Group has been established under the auspices of this IDC, with a view to sharing information on issues relating to home-based telework programs in the Australian Public Service.

The interim findings of the Working Group identify a range of business benefits including; reduced employee absenteeism; improved cost savings resulting from reduced office space requirements; improved ability to attract and recruit staff; fulfilment of EEO objectives; and increased productivity and a higher quality of work resulting from improved staff morale.

The Working Group has agreed upon a series of interim recommendations to support the use of home-based teleworking within Government. These include: increased ICT and Executive support for teleworkers; preparation of better practice information for the development of formal telework arrangements; and joint-research into the extent of informal home-based work and how best to support these practices.

The Australian Department of Employment and Workplace Relations has also published a *Guide to Teleworking* which outlines the benefits of teleworking for employers and employees. The publication highlights important considerations for employers in the design and implementation of a teleworking policy.

4. The impact of information and communication technology on the health sector.

The US-based *Institute for Alternative Futures* conducted a research project on alternative health scenarios for the early 21st century[18]. The main aspect of this is that there are widely differing alternative futures (looking out to 20-40 years) on the potential ratio of GDP going into health. These scenarios include the best health science can deliver (22% of GDP), health for all (12% of GDP), and healthy life (13%). The findings indicate that the lower cost scenarios can actually achieve the delivery of better health outcomes through preventative health policies. The report indicated that more focus on preventative health could provide better financial

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[18] http://www.altfutures.com/pubs/SCENARIOS.pdf

outcomes even without the link to increasing labour force productivity rates. Investigating ways of changing the approach of the health paradigm should be considered focusing on the preventative capabilities and the rise of holistic health coupled with technological advances in technology to assist and enhance wellbeing.

The deployment of broadband-enabled network connectivity throughout the health sector has the potential to benefit hospitals, doctors in allied health practices, medical students and patients. In this context, enhanced connectivity can offer economic efficiencies and improved access to health care in a number of important areas, including:

1. Hospitals
2. Clinical Applications
3. Education and professional development
4. Electronic management of health records

1. Hospitals

There is evidence that accelerated broadband deployment in hospitals can deliver significant economic benefits. For example, a report commissioned by the National Office for the Information Economy and prepared by Access Economics, *The Economic Impact of an Accelerated Rollout of Broadband in Hospitals*[19], estimated a potential net economic benefit of $190 million over 10 years from the deployment of broadband in major hospitals currently lacking broadband capability.

2. Clinical Applications

Broadband technologies can enhance diagnostic outcomes for a range of clinical applications, including ultrasound, radiology and psychiatry. For example, remote monitoring can allow the elderly or the chronically ill to remain in their own homes, potentially reducing the costs associated with prolonged stays by patients in the public hospital system. Through high-speed connectivity a patient's vital signs can be transmitted via broadband from a remote clinic to a hospital. The speed of a broadband connection enables a clinician to respond quickly to a change in a patient's condition providing for more timely health care.

In this context, clinical applications using broadband technology can deliver productivity benefits in terms of improved health outcomes, savings to the health budget and time and cost savings for individuals.

3. Education and professional development

The quality of educational and professional support systems for the health sector can also be improved by online technologies.

A broadband network can facilitate video conferencing between medical staff scattered over a wide area allowing them to participate in professional development

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[19] Access Economics (2003) The Economic Impact of an Accelerated Rollout of Broadband in Hospitals, NOIE http://www2.dcita.gov.au/__data/assets/file/12329/Broadband_in_Hospitals.pdf

seminars, to talk to their peers about particular cases, or participate in real-time classes online.

At a more informal level, individual patients who have basic ICT and information literacy skills can access a wider range of health information which is likely to result in better preventative health outcomes. Access to a wider range of information and professional services may also address the issue of appropriateness of services for the individual.

The Centre for Networking Technologies for the Information Economy (CeNTIE) is currently supporting the development of a hapto-acoustic-visual virtual reality device which enables doctors wearing special headsets to work within a three dimensional context, and interact with remote colleagues using high speed networks.   It is envisaged that one day these devices will potentially enable medical students in remote locations to train on virtual patients[20].

4. Electronic management of health records

The Australian Government and state and territory governments are working collaboratively to establish a national electronic health information network – Health*Connect*. The Health*Connect* project is working to improve information flow across the health sector by allowing patient information to be collected, stored and exchanged electronically between authorised health care providers.

Health*Connect* will improve health outcomes by assisting coordination of healthcare services, reducing duplication of services and creating a comprehensive, lifetime record for the consumer. For example, one of the case studies conducted as part of the Health*Connect* trial in South Australia has demonstrated a noticeable reduction in the number of pathology and radiology tests ordered due to providers having ready access to results and therefore not needing to duplicate tests unnecessarily.

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[20] See http://www.centie.net/proj/haptic-pr.htm).