OECD SCIENCE, TECHNOLOGY AND INDUSTRY OUTLOOK 2006 COUNTRY RESPONSE TO POLICY QUESTIONNAIRE

AUSTRALIA

Section A: General framework and trends in science, technology, and innovation policy

1. Overview of the main directions, objectives and elements of national policies for science, technology, and innovation.

The Australian Government believes that innovation – developing skills, generating new ideas through research, and turning them into commercial success – is critical to Australia's future prosperity. The Australian Government's investment in science and innovation underlines the importance of research and development and innovation in enabling key sectors of the Australian economy to maintain competitive advantage in an increasingly globalised environment.

The Australian Government's agenda depends on effective partnerships between governments at all levels, researchers and business which will share the substantial financial investment and provide the support necessary to ensure that ideas are successfully converted to reality.

In 2005-06 the Australian Government will commit around AUD 5.5 billion in support of science and innovation. The increase in the overall level of Australian Government support for science and innovation in recent years is provided in Table 1 of the Australian Government's 2005-06 Science and Innovation Budget Tables, available at http://www.dest.gov.au/NR/rdonlyres/20B8A026-A27D-4933-A6F6-7BCA28D418E3/5515/S_I_Budget_Tables_200506.pdf.

Australia is a federation, with approximately 36% of GERD being financed by the Australian Government, and 6% by the State and Territory governments in 2002-03. This country response is prepared by the Australian Government, but contains references to major state government policies and initiatives.

Science and technology policy — innovation as key driver of economic growth

On 6 May 2004, the Australian Government announced a major boost to its science and innovation commitment through an AUD 5.3 billion package, *Backing Australia's Ability – Building Our Future through Science and Innovation.*

The new package continues and strengthens its *Backing Australia's Ability* (BAA) programme and takes the Government's investment in BAA to ten years (2001-02 to 2010-11), during which a total of AUD 8.3 billion will be invested in science and innovation, and total Australian Government funding for science and innovation to about AUD 52 billion over ten years. In announcing the new package two years before the initial funding for *Backing Australia's Ability* runs out in 2005-06 the Government is providing certainty and continuity for researchers, universities and business.

Backing Australia's Ability funding is phased, with AUD 170.8 million in 2001-02, and AUD 395.5 million in 2002-03. AUD 617.7 million was provided for the 2003-04 financial year, and funding exceeded AUD 1 billion in 2005-06. Under the expanded programme *Backing Australia's Ability – Building Our Future through Science and Innovation*, funding will be maintained at approximately AUD 1 billion per annum from 2006-07 through to 2010-2011.

The original *Backing Australia's Ability* initiative was introduced by the Australian Government in 2001, to promote science and innovation. The initiative was at the time the largest and most comprehensive set of measures ever put in place by any Australian Government in support of science and innovation. The initiative was an all-of-government approach, the implementation of which was overseen by a science and innovation ministerial council chaired by the Prime Minister and advised by the Chief Scientist.

The new package, *Backing Australia's Ability – Building Our Future through Science and Innovation*, targets three key elements of the innovation system: strengthening Australia's ability to generate ideas and undertake research; accelerating the commercialisation of ideas, and assisting the development of skills.

Key measures funded under the Backing Australia's Ability – Building Our Future through Science and Innovation package include:

- AUD 305 million extra for the Commonwealth Science and Industry Research Organisation's (CSIRO) National Research Flagships. This brings the CSIRO into the Backing Australia's Ability programme for the first time and recognises the effort by the CSIRO to align its large scale collaborative research programmes with the national research priorities.
- A new AUD 1 billion Commercial Ready Programme that merges a number of existing measures to create a one-stop-shop for businesses to access innovation support.
- AUD 200 million extra for the National Health and Medical Research Council (NHMRC) to assist independent medical research institutions.
- AUD 542 million for a National Collaborative Research Infrastructure Strategy (NCRIS) to provide world-class infrastructure to our researchers.
- AUD 38.8 million for Boosting Innovation, Science and Technology and Mathematics Teaching that will involve research bodies and undergraduates in primary and secondary school classes; and
- AUD 7.2 million to co-ordinate and focus research in support of Australia's counter-terrorism needs.

Significant measures from the original *Backing Australia's Ability* that are continued or expanded in the new package include:

- AUD 100 million extra for the Commercialising Emerging Technologies (COMET) programme that has already assisted around 900 companies to get new products to market.
- An extra AUD 1.46 billion to maintain the Australian Research Council (ARC) National Competitive Grants at peak levels. The Grants programme will be refocused to introduce new, and strengthen existing, programme elements to drive more strongly the formation of collaborative research networks.
- AUD 554 million extra for the Research Infrastructure Block Grants.
- AUD 251 million in total for the National ICT Australia (NICTA) initiative to create a world class research centre in Australia focussing on information and communications technology.

- Continuation of the R&D tax concessions introduced under *Backing Australia's Ability*.
- AUD 30.4 million extra for Australia's Biotechnology Centre of Excellence, the National Stem Cell Centre; and
- AUD 127.5 million extra for Co-operative Research Centres (CRC) which will have a stronger commercial focus.

Major achievements in Australia's science and innovation activities are summarised in the Australian Government's Innovation Report *Backing Australia's Ability 2004 - 05 – Real Results, Real Jobs.*

{http://backingaus.innovation.gov.au}

National Research Priorities

In 2002, as part of the implementation of *Backing Australia's Ability*, the Australian Government announced the establishment of four National Research Priorities for Australian research:

- An Environmentally Sustainable Australia;
- Promoting and Maintaining Good Health;
- Frontier Technologies for Building and Transforming Australian Industries; and
- Safeguarding Australia.

The four research priorities are broadly based, thematic and multidisciplinary in nature. Within each of these priorities is a set of goals, which were enhanced in 2003 to strengthen the contributions of social science and humanities research. All Australian Government research and research funding bodies are required to maintain plans which show their progress in implementing the priorities into their activities. The 2004-05 period was the second year in which agencies have reported on their progress in implementing the National Research Priorities. {http://www.dest.gov.au/priorities}

National Collaborative Research Infrastructure Strategy

Funded under the *Backing Australia's Ability – Building Our Future through Science and Innovation* package, the NCRIS is a significant effort to support and develop Australia's research capacity by investing in major research infrastructure. AUD 542 million is being provided under NCRIS over 2005-2006 to 2010-11.

NCRIS is intended to provide researchers with access to modern and relevant infrastructure, link infrastructure funding more directly to Australia's National Research Priorities and foster greater research collaboration and the collaborative use of infrastructure. It builds on investments made through the earlier Systemic Infrastructure Initiative and Major National Research Facilities programme, which formed part of the 2001 *Backing Australia's Ability* research and innovation package.

Quality and Accessibility Frameworks

In May 2004 the Australian Government announced that it would establish Quality and Accessibility Frameworks for Publicly Funded Research as part of the *Backing Australia's Ability – Building our Future through Science and Innovation* package. Two frameworks are being developed in consultation with universities and publicly funded research agencies:

- A Research Quality Framework (RQF) to measure the quality and impact of research conducted in universities and publicly funded research agencies, as well as its benefits to the wider community; and
- An Accessibility Framework to ensure that information about research and how to access it is available to researchers and the wider community.

The NCRIS and the Quality and Accessibility Frameworks aim to better inform major research infrastructure investments, encourage research collaboration, strengthen monitoring of research quality and promote accessibility of research information and resources.

National Tourism Investment Strategy

Australia has been undertaking the development of a National Tourism Investment Strategy in cooperation with the private sector. The aim of the Strategy will be to support the flow of private investment into tourism-related accommodation and transport infrastructure, education and innovation.

In terms of innovation, the Strategy is focusing on supporting the uptake of new technologies and the evolution of new tourism products. This will be achieved by identifying impediments to private sector investment in these areas and proposing appropriate remedies. The overarching objectives will be to:

- assist developers and operators to improve the quality and diversity of tourism product in response to consumer demands;
- increase the awareness of, access to and take-up of new technologies that enhance tourism industry performance and competitiveness; and
- improve tourism business operations and management practices.

The tourism industry contributes (directly and indirectly) to almost 10 per cent of employment nationally and accounts each year for AUD 73 billion of Australian goods and services, including AUD 17 billion in exports.

Role of State Governments

In addition to investment in science and innovation by the Australian Government, the federal system of government in Australia has lead to state and territory governments playing an increasingly important role in establishing research infrastructure and related industry clusters in fields such as biotechnology, information and communications technology (ICT) and resource processing. Examples include:

The Queensland Government commenced a series of 'Smart State' initiatives in 1998, including a 10-year *Bioindustries Strategy* to position Queensland as a regional hub for biotechnology. The second stage, *Smart Queensland: Smart State Strategy 2005–2015* was launched in 2005. *Smart Queensland* is backed by more than AUD 470 million over four years for initiatives across several portfolios, including around AUD 220 million allocated to science, research and industry innovation activities. {http://www.smartstate.qld.gov.au/}

Through the Victorian Government's AUD 620 million Science, Technology and Innovation Initiative, Victoria has made significant investments in innovation including new scientific and communications infrastructure such as the Australian Synchrotron; centres of research excellence; programmes to assist business to become more innovative; and projects to maintain and build a skilled and creative workforce. The Victorian Government announced in 2005 the allocation of AUD 104 million over

5 years for an Energy Technology Innovation Strategy and a range of ICT enhancements. {http://www.businessaccess.vic.gov.au/BUSVIC.1179884/LANDING/380673979/SEC10.html}

The New South Wales (NSW) Government Department of Primary Industries' *Science and Research Program* constitutes a significant portion of the state's investment in innovation, science and research. It aims to provide strategic science that enhances competitiveness, growth, sustainability, and bio-security of NSW primary industries. It was allocated AUD 110 million in the NSW Government's 2005-06 budget. DPI seeks to coordinate investments in primary industry innovation and foster alliances and cooperative ventures with universities, other states, Australian Government and industry bodies. {http://www.nsw.gov.au/}

The South Australian Government has developed a science, technology and innovation, ten year plan (STI^{10}) in addition to the State's Broadband and ICT strategy. The South Australian Government is supporting the development of STI precincts across the State each of distinct capability, including the precincts forming the Adelaide Innovation Constellation. {http://www.innovation.sa.gov.au/}

The Western Australian Government is continuing to implement its Innovate WA package, which is aimed at strengthening Western Australia's long-term economic competitiveness by establishing Western Australia as a leader in innovation related activities. {http://www.scienceandinnovation.dpc.wa.gov.au/}

In April 2004, Tasmania announced a Science and Technology Industry Plan. The Plan provides a framework for the future development of the Tasmanian science and technology sector. {http://www.development.tas.gov.au/}

2. Changes in the priority given to different areas of science, technology, and innovation policy or the policy instruments used to achieve them.

The Australian Government recognises the importance of raising the capacity of business to innovate, and is encouraging a diverse range of industries to increase their commitment to industrial innovation. Recent initiatives to support business innovation include:

- Industry Cooperative Innovation Program (ICIP) is a competitive grants programme to support cooperative industry projects which relate to development and use of new technologies. The total value of the programme is AUD 25 million. ICIP was launched on 2 June 2005.
- Renewable Energy Development Initiative (REDI) is a competitive grant programme supporting renewable energy innovation and commercialisation. REDI was announced on 15 June 2004 as part of the white paper, Securing Australia's Energy Future. It provides AUD 100 million over seven years in competitive grants for Australian businesses to develop renewable energy technologies.
- Pharmaceuticals Partnerships Program aims to promote high value pharmaceuticals research and development in Australia and to capitalise on Australia's world class biotechnology, health and medical research activities.
- TechFast is a pilot programme to strengthen the transfer of IP from research institutions to small and medium-sized businesses (SMEs) was funded through an election commitment. AUD 2.4 million is being provided to the Australian Institute for Commercialisation for a 12-18 month pilot.

The new look Smart Start website and publication were officially launched in September 2005 and are designed to introduce small businesses to essential intellectual property (IP) concepts when starting out in business. In October 2005, IP Australia introduced a new service called the Trade Marks Assisted Filing

Service which provides applicants with an up-front assessment of the suitability of their trade mark for registration, prior to filing their application.

Policy advice within the Australian Government is directed at building a globally competitive Information and Communications Technology (ICT) industry and information economy that captures opportunities arising from ICT's role as a key driver of growth in the broader economy. This advice is focused in particular on industry development and fostering innovation.

Recent developments in Australia's system of copyright law that have direct relevance to Australia's ICT industries include the introduction of a new Internet Service Provider (ISP) liability scheme, the extension of the term of copyright protection and enhanced criminal sanctions are recent changes to Australia's system of copyright law. The changes commenced on 1 January 2005 and were introduced in order to implement Australia's obligations under the Australia-United States Free Trade Agreement.

Challenges that are expected to be addressed in future science technology and innovation policy initiatives and/or that have been identified in forward-looking exercises.

One of the key ways that publicly funded research can have a productive impact is through it being translated into marketable products, processes and services. This is an important aspect of the Australian research and innovation system. Bringing research results and outputs to the market in a timely and effective manner helps demonstrate the relevance and value of that research, ensuring that it contributes to the economy and to the broader community. It is therefore important for researchers and research institutions to build strong, ongoing connections with industry and investors who can help bring ideas, inventions and innovations to market.

National Collaborative Research Infrastructure "Roadmap"

The NCRIS Roadmap is being developed by the NCRIS Committee to inform decisions on where Australia should make strategic infrastructure investments to further develop its research capacity, both in key areas and more broadly.

When finalised, the Roadmap will provide a framework of capabilities, prioritised on the basis of the NCRIS principles, that is the recommended focus for medium to large-scale (up to AUD 60 million) research infrastructure investment over the next 10 years. It will focus on the capabilities that Australia should strive to develop, rather than specific infrastructures, and also make some recommendations on the appropriate means to support them.

The Roadmap will help to facilitate a coordinated approach to infrastructure investment across governments and agencies that: concentrates effort nationally on areas of greatest strategic impact; increases collaboration within the research system and between it and the wider community; and reduces the duplication and sub-optimal use of resources arising from lack of co-ordination.

The Roadmap will specifically provide a framework for the process of the allocation of the NCRIS programme funding available from 2006-07 onwards.

Review of Australia's venture capital industry

A review of Australia's venture capital industry is currently underway. It will consider the appropriateness, effectiveness and efficiency of existing Australian Government support for venture capital and later stage private equity investment, in the context of a thorough review of the industry. The review is due to report to government in early 2006.

Developing Information and Communications Technology capability

The ICT Framework for the Future report, *Enabling our Future*, was released by the Minister for Communications, Information Technology and the Arts on 15 April 2003. The Framework report focuses on key elements in the innovation infrastructure that will support the longer-term development of the ICT industry and the growth of a national ICT capability. It provides a blueprint that builds on the substantial foundations put in place by the Government in recent years, including the *Backing Australia's Ability* packages, support for ICT start-up companies, recent reforms to the taxation of risk capital and other Government initiatives.

The framework in *Enabling our Future* maintains, and where appropriate strengthens, policy settings to provide a long-term consistency of approach, improved coordination of ICT-related initiatives and better integration of ICT into national research infrastructure. As part of the ongoing development process, the framework was reviewed in 2003 and 2004 to identify new and emerging issues. The Government has made a commitment to identify priority areas for researchers and industry to assist industry, researchers and Government build critical mass in ICT R&D.

Strategic Framework for the Information Economy

Released in July 2004, *Australia's Strategic Framework for the Information Economy 2004-2006 – Opportunities and Challenges for the Information Age* (SFIE) provides the policy platform to address new challenges to Australia's position as a leading information economy. It replaced '*A Strategic Framework for the Information Economy – Identifying Priorities for Action*', which was adopted by the Australian Government in 1998. The SFIE sets out four key priorities and sixteen supporting strategies that focus on a whole-of-government agenda to ensure the ongoing development of Australia's information economy.

Section B: Public sector research and public research organisations

1. Major policy changes related to the financing of public R&D.

Changes in overall levels of R&D funding for public research organisations in recent years.

The following table contains recent Australian Government support for the major Australian Government research agencies, higher education research and research training, and science and technology programmes (AUD M).

Year	2002-03	2003-04	2004-05 (est. actual)	2005-06 (budget est.)	2007-08	Percentage change 2002-03 to 2005-06
	AUD million					%
Major Australian Government Research Agencies	1,218.1	1,304.1	1,290.7	1,323.7	Forecasts not available	8.7%
Higher Education Research & Research Training	1,972.8	2,161.4	2,249.5	2,257.3		14.4%
Science & Technology Programmes	694.1	866.0	905.4	982.4		41.5%

Higher Education Research and Research Training includes Australian Government support for the ARC and Performance Based Block Funding. Further detail is available in Table 1 of the Australian Government's 2005-06 Science and Innovation Budget Tables available at:

http://www.dest.gov.au/NR/rdonlyres/20B8A026-A27D-4933-A6F6-7BCA28D418E3/5515/S_I_Budget_Tables_200506.pdf

Shifts in the allocation of funding across public research organisations

The distribution of Australian Government science and innovation support in recent years has seen a percentage increase in support for science and technology programmes, including the NHMRC, CRC, and rural, energy and the environment programmes. The 2005-06 Budget indicates an increase in the distribution of science and innovation support to business R&D and innovation, including the Industry R&D Tax Concession.

The following table indicates the distribution of Australian Government support for science and innovation by main component, from 2002-03 to 2005-06.

Year	2002-03	2003-04	2004-05 (estimated actual)	2005-06 (budget estimate)
	%			
Major Australian Government Research Agencies	25.9	25.2	24.2	23.9
Higher Education Research and Research Training	41.9	41.7	42.3	40.8
Business R&D and Innovation	17.4	16.5	16.5	17.6
Science and Technology Programs	14.8	16.7	17.0	17.7

Further information on recent trends in the distribution of Australian Government support for science and innovation is presented in Figure 2.1.6 of the Australian Science and Innovation System: A Statistical Snapshot 2005, available at

http://www.dest.gov.au/sectors/science_innovation/publications_resources/profiles/australian_science_innovation_system_stats_snapshot_2005.htm

Shifts in the allocation of funding across different socio-economic objectives

In 2004, the distribution of Australian Government budget appropriations or outlays for R&D by major objectives was 38.3% as general university funds, 35.6% for economic development programmes, 21.7% for health and environment programmes, and 4.3% for non-oriented research programmes.

Analysis of Australian Government support for science and innovation in recent years by socio-economic objective indicates significant increases in the areas of the control and care of the environment; the protection and improvement of human health; the exploration and exploitation of the earth; and defence.

As indicated in the table below the greatest percentage increase in Australian Government support for science and innovation from 2002-03 to 2005-06 occurred in the category of non-oriented research.

Socio-Economic Objective	2002-03	2003-04	2004-05	2005-06
	AUD million			
Non-oriented research	143.8	174.1	197.1	356.1
Control and care of the environment	83.8	107.1	121.6	170.0
Protection & improvement of human health	355.7	469.4	522.2	585.8
Exploration & exploitation of the earth	259.7	286.2	292.7	404.0
Defence	265.3	283.7	283.5	345.8
Social structures & relationships	73.0	92.2	112.0	94.6
Infrastructure & general planning of land use	72.7	87.9	81.3	81.7
Agricultural production & technology	400.4	438.8	419.0	415.7
Industrial production & technology	1262.1	1350.8	1398.7	1282.2
Research financed from university funds	1671.5	1757.2	1766.0	1699.0
Other civil research	0.0	0.0	1.4	0.6
Production, distribution & rational use of energy	115.0	128.1	126.7	102.6
Exploration & exploitation of space	0.7	9.0	1.0	0.4
Total	**4704**	**5185**	**5323**	**5538**

Australian Government support of science and innovation distributed by socio-economic objective, from 1998-99 to 2005-06, is presented in Table 5 of the Australian Government's 2005-06 Science and Innovation Budget Tables, available at:

http://www.dest.gov.au/sectors/science_innovation/publications_resources/profiles/australian_science_innovation_system_stats_snapshot_2005.htm

Shifts in the allocation of funding across different fields of science and technology

Fostering Information and Communications Technology Innovation

BAA provides direct support for ICT innovation through the establishment and ongoing support for an ICT Centre of Excellence (NICTA), funding for advanced communications testbeds and networks (Advanced Networks Program) and support for ICT incubators.

- The Australian Government has allocated AUD 380.5 million over ten years to 2010-11 for the establishment of a world-class, world scale ICT research and research training institute, NICTA.
- Since 2000, the Australian Government has invested AUD 122 million in ICT incubators, including an extension of funding of AUD 36 million until 2007-08.
- The Australian Government provided additional funding for research into leading edge broadband communications under the Advanced Networks Program (ANP). Under BAA, funding was extended until 2006-07, which will allow the three ANP projects – mNet, GrangeNet and CeNTIE - to continue and intensify research into, and explore opportunities to commercialise, leading-edge broadband applications as well as maintain, upgrade and extend the networks that were established with the initial ANP funding. The ANP has received AUD 60 million in total funding since it commenced in 2000. The Advanced Networks Program was subject to a mid-term review in 2003, available at: http://www.dcita.gov.au/__data/assets/file/10521/Advanced_networks_program_mid-term_review.pdf

Programmes are typically reviewed in mid term and at the conclusion for funding. Other evaluations in train are:

- An independent evaluation of ICT incubators in 2003 revealed that the incubators had performed well by international standards but that without a period of further funding most of the incubators

would not be financially viable. Following this evaluation a four year extension of funding was provided to 2007-08.

- A review of NICTA by an external expert panel is being carried out in 2005 to inform the development of the next funding deed with NICTA for the period 2006-07 to 2010-11.
- The Information Technology Online programme is currently being evaluated.

Recent policy developments under the Environment and Heritage portfolio

Promoting an environmentally sustainable nation is one of the four National Research Priorities announced by the Prime Minister in 2002. Funding for environmental R&D and innovation programmes administered by the Environment and Heritage Portfolio has increased by 18.7%, from AUD 154.7 million in 2004-05 to AUD 183.7 million in 2005-06. The increased support for environmental research and innovation programmes is in recognition of Australia's need to strengthen local expertise and to actively participate in the global push to develop environmentally sustainable technologies.

Government support for the Australian Tsunami Warning System (ATWS) and related international initiatives in the Indian Ocean and Southwest Pacific Ocean represented a major policy shift in 2005. The rationale was security of life and the natural and built environment. The AUD 63 million initiative involves major scientific and technical advances in seismic and ocean monitoring as well as in natural hazard prediction and warning systems. The ATWS was a major budgetary measure that required a high level of cooperation between several Government departments. The ATWS initiative also represented a major measure in the area of services for security and safety.

The AUD 100 million Commonwealth Environment Research Facilities (CERF) programme, with a focus on public good environmental research, is intended to support the establishment of national research hubs of Australia's best environmental researchers, and to support multi disciplinary approaches to addressing critical environmental challenges facing the Australia Government. The programme will operate from 2005-06 to 2009-10.

Climate research in Australia is conducted by a variety of organisations and institutions including government research agencies and universities. The Australian Climate Change Science Programme is the key facilitator of Australian climate change science. This programme provides strategic research funding to improve understanding of the causes, nature, timing and consequences of climate change, so that industry, community and government decisions are better informed. In May 2004, the Australian Government renewed funding for the programme, increasing the amount to AUD 30.7 million over four years. The effect of this funding is magnified by contributions of equal value from the CSIRO and the Australian Bureau of Meteorology. An independent evaluation in 2003 assessed the programme as being the core driver of Australian climate change science, and as highly effective and efficient, observing that the programme has supported a strong level of engagement in the international research effort. {http://www.greenhouse.gov.au/science/accsp/}

In 2004, Australian Government introduced the AUD 14.4 million National Climate Change Adaptation Programme to begin preparing governments and vulnerable industries and communities for the unavoidable consequences of climate change. The Programme will support policy analysis of the cross-sectoral implications of climate change, partnerships to address climate change in regions of national priority, and the development of tools and information to assist in the development of adaptation plans.

{http://www.greenhouse.gov.au/impacts/index.html#programme}

Changes in the use of different types of funding instruments for financing R&D

In 2005-06 university research will benefit from an increase in funding administered by the Australian Research Council. This funding has increased from AUD 481 million in 2004-05 to AUD 556.5 million in 2005-06, an increase of 15.6%. Including performance based block funding through the *Higher Education Support Act*, the Australian Government's support for university research and research training in the 2005-06 Budget will total AUD 1.808 billion.

2. Major initiatives to reform the organisation and governance of universities and other public research organisations to improve the quality of their R&D or their ability to contribute to economic growth and other social objectives.

Australian Government initiatives to integrate the national science and research effort more closely with Australia's economic, social and environmental goals include:

- The National Research Priorities, announced in 2002 as part of the implementation of *Backing Australia's Ability* to address areas of strength, opportunity or need in Australian research and assist in promoting, coordinating and implementing the national research effort.
- The NCRIS and the RQF (see below).
- The CERF Program is seeking to facilitate stronger synergies and the creation of multi-institutional, multi-disciplinary national research hubs targeting significant environmental challenges.
- The stronger emphasis by the CRC on the commercialisation and utilisation of research as described in Section D.
- The CSIRO has reviewed its research portfolio of 125 research programmes to determine its research priorities for 2006/07. The relevance and impact of these research programmes was assessed against criteria such as the 'value' of the research and its likely benefit to Australia socially, economically and environmentally. This will ensure CSIRO will continue to deliver highly relevant research for Australia and beyond.

National Collaborative Research Infrastructure Strategy

Funded under the *Backing Australia's Ability – Building Our Future through Science and Innovation*, the NCRIS is a significant effort to support and develop Australia's research capacity by investing in major research infrastructure. AUD 542 million is being provided under NCRIS over 2005-2006 to 2010-11.

NCRIS is intended to provide researchers with access to modern and relevant infrastructure, link infrastructure funding more directly to Australia's National Research Priorities and foster greater research collaboration and the collaborative use of infrastructure. It builds on investments made through the earlier Systemic Infrastructure Initiative and Major National Research Facilities programme, which formed part of the 2001 *Backing Australia's Ability* research and innovation package.

The Government is being advised on the implementation of NCRIS by an overarching NCRIS Committee. The NCRIS Committee has in turn consulted extensively with the research and wider communities. Reflecting the NCRIS Committee's advice, the key principles underpinning NCRIS are that:

- Australia's investment in research infrastructure should be planned and developed with the aim of maximising the contributions of the R&D system to economic development, national security, social wellbeing and environmental sustainability;

- Infrastructure resources should be focussed in areas where Australia is, or has the potential to be, world-class (in both discovery and application driven research) and provide international leadership;
- Major infrastructure should be developed on a collaborative, national, non-exclusive basis. Infrastructure funded through NCRIS should serve the research and innovation system broadly, not just the host/funded institutions. Funding and eligibility rules should encourage collaboration and co-investment. It should not be the function of NCRIS to support institutional level (or even small-scale collaborative) infrastructure;
- Access is a critical issue in the drive to optimise Australia's research infrastructure. In terms of NCRIS funding there should be as few barriers as possible to accessing major infrastructure for those undertaking meritorious research;
- Due regard be given to the whole-of-life costs of major infrastructure, with funding available for operational costs where appropriate; and
- The Strategy should seek to enable the fuller participation of Australian researchers in the international research system.

An expert committee, the National Collaborative Research Infrastructure Committee assisted in implementing these recommendations. The Committee has developed a Roadmap that will identify Australia's critical research capabilities. It was assisted by four expert subcommittees structured along the lines of Australia's National Research Priorities.

The development of NCRIS has involved extensive consultations with all stakeholders. The National Collaborative Research Infrastructure Committee has consulted with all States and Territory governments, other Commonwealth Government portfolios and the research community more broadly in every State and Territory and with both the public and private sector. Much of the work of the Committee has been available on its website and comment has been welcomed.

{http://www.dest.gov.au/sectors/research_sector/policies_issues_reviews/key_issues/ncris/default.htm}

Research Quality Framework

In May 2004 the Australian Government announced that it would establish Quality and Accessibility Frameworks for Publicly Funded Research as part of the *Backing Australia's Ability – Building our Future through Science and Innovation* package of initiatives. Two frameworks are being developed in consultation with universities and publicly funded research agencies:

- A Research Quality Framework to measure the quality and impact of research conducted in universities and publicly funded research agencies, as well as its benefits to the wider community; and
- A Research Accessibility Framework to ensure that information about research and how to access it is available to researchers and the wider community.

When developed, the RQF will provide the basis for distributing research resources in Australia. In a small nation like Australia, it is critical that public investment in research is directed to areas of excellence and public benefit.

The aim of the RQF initiative is to develop the basis for an improved assessment of the quality and impact of publicly funded research and an effective process to achieve this. The RQF should:

- be transparent to government and taxpayers so that they are better informed about the results of the public investment in research; and
- ensure that all publicly funded research agencies and research providers are encouraged to focus on the quality and relevance of their research.

Currently there is no system-wide and expert-based way to measure the quality and impact of research conducted in universities and publicly funded research agencies and its benefits to research and the wider community. The RQF will drive desired behaviours in the research sector, namely, the identification, encouragement and reward of research excellence in Australia's publicly funded research system.

The development of the RQF is being overseen by an Expert Advisory Group comprising international and national representatives from universities, publicly funded research agencies and industry groups.

Final advice on the preferred RQF model was provided by the Expert Advisory Group to the Minister for Education, Science and Training on 20 December 2005. The current proposed timeline anticipates that the RQF will be implemented by 2007, following refinement and technical work (including modelling of financial implications) throughout 2006. The first reporting period for the RQF is expected to be 2008, whereupon research funding implications would follow.

Information on the development process for the RQF, including related publications, is available at: http://www.dest.gov.au/resqual/default.htm

3. Major shifts or changes in priority among the approaches for strengthening public sector research.

Increased levels of funding for the Australian Nuclear Science and Technology Organisation (ANSTO)

ANSTO was provided with AUD 36.1 million (over four years from 2004-05) by the Australian Government for additional costs associated with the operation and construction of the Open Pool Australian Light-water (OPAL) replacement research reactor. The Government has provided approximately AUD 300 million for OPAL since deciding to replace the High Flux Australian Reactor in 1997.

OPAL's primary uses will be: the production of radioisotopes; irradiation of silicon for use in computer chips and power electronics; and provision of neutron beams for research. Eight neutron beam instruments are approved for OPAL. They will be operated by a world-class team of scientists and ANSTO considers that the facilities will rank with the top three such facilities worldwide. The facility will have the capacity for further expansion, including potential for a second neutron guide hall.

Governance of public research organisations

On 12th August 2004 the Australian Government's released its response to the report on the review of corporate governance of statutory authorities and office holders. The review was carried out by Mr John Uhrig, in consultation with Ministers, statutory office holders, departments, and the wider community including business and consumer groups. The report recommends two templates designed to ensure good governance exists: one where governance can best be provided by 'executive management', and the other where it can best be provided by a 'board'.

The Australian Government endorsed Mr Uhrig's report and decided that some 170 portfolio bodies would be assessed by their respective Ministers. The ARC and the NHMRC were some of the first bodies to be assessed. In July 2005 the Australian Government announced enhancements to the governance of the ARC so that the ARC is consistent with an executive management model. The ARC Board will be retired by early 2006. As a result of the assessment, the NHMRC will become an independent statutory body from 1 July 2006.

The governance arrangements of the science agencies CSIRO, ANSTO and the Australian Institute of Marine Science (AIMS) are currently being assessed as part of the Uhrig Review process.

{http://www.dest.gov.au/Ministers/Media/Nelson/2005/07/n1155150705.asp}
{http://www.finance.gov.au/scripts/Media.asp?Table=MFA&Id=550}

New structures for performing research

CSIRO, ANSTO, and AIMS agreed in their 2004-2007 Triennium Funding Agreements to undertake a continuing process for assessment of research performance which will form part of the RQF. Each research agency is required to undertake a transparent process of research performance assessment. Areas which may be assessed include research quality and achievements; application and/or dissemination of research outputs; and development of researchers.

Consistent with this, all the CSIRO's Divisions will be reviewed during 2004-07 as part of a formal programme of Science Assessment Reviews to assess the quality of research. The Divisional Reviews are continuing to confirm that CSIRO's research capabilities are appropriately aligned against the two dimensions of research community impact and industry/community impact brought together to undertake what has been an effective and rigorous assessment of the quality of Divisional scientific outputs. ANSTO and AIMS are also undertaking a research performance assessment process.

National Principles of IP Management for Publicly Funded Research

In 2001, to ensure improved commercial outcomes from publicly funded research, the ARC and NHMRC, in conjunction with other bodies, developed a set of national principles for best-practice IP identification, protection and management by researchers and research institutions. {http://www.arc.gov.au/grant_programs/national_ip.htm}

The purpose of developing the National Principles of IP Management for Publicly Funded Research is to assist researchers, research managers and their research institutions, in ensuring that they have access to best practices for the identification, protection and management of IP, and therefore, to maximise the national benefits and returns from public investment in research.

The National Principles are expected to evolve over time in the light of the experiences of the funding agencies, research institutions and researchers. A review of the National Principles is likely to commence in 2006.

4. New or recent changes in policies adopted by government, public research funding bodies or public research institutions to improve access to data resulting from publicly funded research.

Accessibility Framework for Publicly Funded Research

Under the *Backing Australia's Ability – Building our Future through Science and Innovation* package, an Accessibility Framework is to be developed in consultation with universities and publicly funded research agencies.

The Accessibility Framework is intended to provide a strategic framework to improve access to research information, outputs and infrastructure. It will be an agreed system-wide approach for managing research outputs and infrastructure so that they are discoverable, accessible and shareable, in order to improve the quality of research outcomes, reduce duplication and better manage research activities and reporting.

The Government is keen to ensure that, through the establishment and linkage of electronic digital repositories, national scholarly output and research data derived from Australian Government funding will be available to researchers and the wider community, subject to agreed ways to safeguard the privacy of participants and the protection of confidential information and commercially sensitive data.

The Framework will embrace a range of e-Research environments that are emerging from the changing innovative practices of scientists and scholars in all disciplines. It will be largely based on existing investments in research infrastructure, which are laying the foundations for e-research in which advanced computational, collaborative data acquisition and management services are available to researchers through high-performance networks.

Further information on the Accessibility Framework is provided at:
http://www.dest.gov.au/sectors/research_sector/policies_issues_reviews/key_issues/accessibility_framework/

Public Research Institution Data

Examples of public research institutions improving access to data resulting from publicly funded research include:

- The Bureau of Meteorology has the most popular Australian Government web site and this is increasingly used to disseminate scientific information. The Bureau of Meteorology is actively pursuing IT solutions that will allow its publicly-funded information to be more broadly available. It has joined with other Commonwealth agencies in an initiative to more effectively and efficiently distribute oceanographic information.
- The Commonwealth Environment Research Facilities programme is specifically targeting public good environmental research. It is expected that all research outputs will be publicly and freely accessible and available to the Government, end-users and the general public, preferably by electronic means where appropriate.

5. Looking to the future, the main challenges that the science system is expected to face and the main issues that policy makers will need to address.

The *Backing Australia's Ability – Building Our Future through Science and Innovation* package announced in 2004 is the Australian Government's response to the three major reviews of the research system: the Evaluation of the Knowledge and Innovation reforms, the Closer Collaboration Review and the National Research Infrastructure Taskforce. Details on the Australian Government's response to the three reviews of the research system may be found at:

http://www.dest.gov.au/sectors/research_sector/policies_issues_reviews/reviews/previous_reviews/government_response_to_research_reviews.htm

In December 2002 the Australian Government announced the establishment of four National Research Priorities for Australian research: an Environmentally Sustainable Australia; Promoting and Maintaining

Good Health; Frontier Technologies for Building and Transforming Australian Industries; and Safeguarding Australia.

These are areas of particular social, economic and environmental importance to Australia, and areas in which a whole-of-government focus has the potential to improve research and broader policy outcomes. All Australian Government research and research funding bodies are required to maintain plans which show their progress in implementing the priorities into their activities. The 2004-05 period was the second year in which agencies have reported on their progress in implementing the National Research Priorities. {http://www.dest.gov.au/priorities}

Section C: Government support for private-sector R&D and innovation

1. Major policy changes in the instruments used to support private sector R&D and innovation.

The Australian Government recognises the importance of raising the capacity of business to innovate, and is encouraging a diverse range of industries to increase their commitment to industrial innovation. Recent initiatives to support private sector R&D and innovation include:

Commercial Ready

Commercial Ready is a competitive merit-based grant programme supporting innovation and its commercialisation. It aims to stimulate greater innovation and productivity growth in the private sector by providing around AUD 200 million per year in competitive grants to SMEs between 2004-05 and 2010-11. A wide range of project activities can be supported, extending from initial research and development, through proof of concept, to early-stage commercialisation activities.

Industry Cooperative Innovation Program

ICIP is a competitive grants programme to support cooperative industry projects which relate to development and use of new technologies. The total value of the programme is AUD 25 million. ICIP was launched on 2 June 2005. The objectives for ICIP are:

- to encourage business to business cooperation on innovation projects that enhance productivity, growth and international competitiveness of Australian industries, and with particular focus on meeting strategic industry needs; and
- to generate national benefit for the Australian economy.

Automotive Competitiveness and Investment Scheme

Automotive Competitiveness and Investment Scheme (ACIS) is an entitlement scheme aimed at improving the Australian automotive industry's short and long term competitiveness, including from 2005, introduces the AUD 150 million Motor Vehicle Producer (MVP) R&D Scheme. This new scheme commences on 1 January 2006 and will provide MVPs with access to R&D assistance within the MVPs existing share of the ACIS capped pool of funding.

Renewable Energy Development Initiative

REDI is a competitive merit-based grant programme supporting Renewable Energy innovation and its commercialisation. REDI was announced on 15 June 2004 as part of the white paper, "Securing Australia's Energy Future". It provides grant funding up to AUD 100 million in competitive grants to allocate to Australian businesses over seven years. It offers grants of between AUD 50,000 and AUD 5 million for

research and development, proof-of-concept, and early-stage commercialisation projects with high commercial and greenhouse gas abatement potential.

{http://www.ausindustry.gov.au/content/level3index.cfm?ObjectID=B7C70A4B-E588-40C9-AD6542408BFD1AAB&L2Parent=AEB901E5-7CB8-4143-A3BF33B2423F9DA6}

{http://www.pmc.gov.au/initiatives/energy.cfm}

Pharmaceuticals Partnerships Program

Pharmaceuticals Partnerships Program (P3) aims to promote high value pharmaceuticals research and development in Australia and to capitalise on Australia's world class biotechnology, health and medical research activities. Competitive grants provide 30% of the amount spent on eligible research and development in Australia above a base level of expenditure, up to a maximum of AUD 10 million. It is accessible to all businesses with a 3 year track record that are part of or contribute to the Australian Pharmaceutical industry.

Food Innovation Grants

The Food Innovation Grants (FIG) programme provides matching grants to food businesses operating in Australia to help them to develop innovative ideas involving a scientific or technical challenge and to take the innovation through to commercial results. The FIG programme helps large and small food businesses undertaking research and development and commercialisation by sharing the risks associated with innovation. FIG help large and small food businesses undertaking R&D and commercialisation through sharing the risks associated with innovation. Projects funded through the FIG programme include family-owned companies, as well as medium-size enterprises and large multinational companies. A review into the appropriateness, effectiveness, and efficiency of the FIG programme, published in November 2004, is available on the National Food Industry Strategy Ltd. website (http://www.nfis.com.au).

Government Procurement

Australian Government agencies are required to make their purchases on a 'value for money' basis. However, the Government recognises procurement practices can be important in promoting local industry.

The Australia-United States Free Trade Agreement (AUSFTA) specifically prohibits offsets in association with government procurement. However, this does not apply to Government policies supporting SMEs and the Government has in place a range of measures to facilitate SME participation in ICT contracts. Agencies are required to ensure that SMEs have appropriate opportunities to compete for business and, for ICT contracts over AUD 20 million, Australian Government agencies are required to specify a minimum SME participation level of up to 20% in the tender documentation.

The Government is also working to facilitate appropriate capping of supplier liability and commercialisation of IP in relation to ICT contracts.

There are a number of procurement and sourcing policies, programmes and information resources within the Australian Government:

- *Source IT website*, which is a Government initiative established in 2003, facilitates agencies presenting strategies and options to help agencies deal with ICT – http://www.sourceit.gov.au/sourceit/ict

- *Guide to ICT Sourcing Australian Government*, is a guide for agencies on strategic decision-making for ICT sourcing. First published in 2004, this initiative will be updated and republished in 2005-06 – http://www.sourceit.gov.au/sourceit/ict
- *Guide to Open Source Software Australian Government* was published in 2005. It consists of information directed toward agency understanding of open source software in the context of business needs and the value for money framework of the Australian Government Commonwealth Procurement Guidelines – http://www.sourceit.gov.au/sourceit/oss
- White Branding is a process that uses a component based ICT model to develop a generic product set that is available for re-use across government and non-profit organisations – this process was used by the Australian Government in collaboration with commercial vendors to establish a robust and flexible open source software platform for web content management. The *White Branding Documentation Suite* is a guide for eligible government agencies and not-for-profit groups on using the white-branded content management system. It was first published in 2005 – http://www.sourceit.gov.au/sourceit/whitebranding
- *Demand and Value Assessment Methodology* (DVAM) is a high priority initiative for ICT project business case development. Developed in 2004, a revised and updated DVAM is to be released in 2005 – http://www.agimo.gov.au/government/damvam
- Similar to DVAM, the *ICT Investment Framework* is another high priority Government initiative for ICT project business cases. It is currently under development and staged for release in 2006, and provides useful information on expenditure data collection, strategic planning and performance management – http://www.agimo.gov.au/government/damvam
- *Commonwealth Electronic Procurement Guide*: Published in 2000, this guide for electronic payments and procurement is set for further development and release in 2005-06 – http://www.agimo.gov.au/government/e-procurement

Government programmes to promote or encourage e-procurement and/or e-invoicing

The Australian Government has a number of policies, programmes and information resources specifically designed to encourage the take-up of e-procurement and/or e-invoicing technologies:

- *Austender*, an Australian Government electronic tendering system operating in accordance with the Financial Management Act (1997) developed by the Australian Government, is a high priority initiative that is subject to ongoing enhancements – https://www.tenders.gov.au/federal/index.shtml
- *E-Procurement Research Reports*, an Australian Government report on better practice case studies in electronic procurement, was released in 2005 – http://www.agimo.gov.au/publications/2005/may/e-procurement_research_reports
- *Doing Business with Government Online*, is a toolkit that provides suppliers with advice and guidance on how to get started doing business online with Government (published in 2002) – http://www.agimo.gov.au/publications/2002/11/dbowg
- *Measures in Support of Environmentally Friendly ICT* was published in 2005 and reports on Australian Government ICT procurement and investment activities to reduce environmental impacts from the use of ICT, will be further developed in 2005-06 – http://www.agimo.gov.au/government/enviro_friendly_ict/environmentally_friendly_ict2

Trade Marks Assisted Filing Service

On 3 October 2005, IP Australia introduced a new service called the Trade Marks Assisted Filing Service which provides applicants with an up-front assessment of the suitability of their trade mark for

registration, prior to filing their application. This service was developed to assist private applicants that have little knowledge of trade mark law and those who have not obtained legal or professional advice regarding the suitability of their trade mark.

Other forms of public support for innovation

TechFast

In 2004-05, the Department of Industry, Tourism and Resources provided funding support for the delivery of the pilot programme Techfast, announced in the election commitment in From Strength to Strength, October 2004. Techfast is an initiative of the Australian Institute for Commercialisation, and follows on from a Queensland based pilot supported by the Queensland Government. Techfast will support SME firms to develop links to public sector research organisations to commercialise intellectual property from that institution. The pilot is due to be completed by June 2006.

Small Business Entrepreneurship Program

The Small Business Entrepreneurship Program is a merit-based grant programme that aims to assist in fostering entrepreneurship, including the growth potential and/or sustainability of small businesses by supporting initiatives that will support:

- general skills development and mentoring services for small business owners and/or managers;
- mentoring and skills development services for succession planning to help small business owners maximise the value and marketability of their businesses and to provide strategies to exit the business, while ensuring business continuity; and
- incubation services provided through small business incubators.

ICT Incubators Program

Since 2000 the Australia Government has invested AUD 122 million in ICT incubators, including an extension of funding of AUD 36 million until 2007-08. These incubators provide seed capital and business advice to ICT start-up companies across Australia with the aim of accelerating their growth and development.

Advanced Networks Program

The Australian Government's AUD 60 million Advanced Networks Program supports three projects to develop, trial and demonstrate advanced experimental networks and to support R&D using the networks as testbeds for innovative applications. The projects encourage experimentation in, and commercialisation of, leading edge network technologies and products; assist the development and delivery of advanced applications, services, products and content that require the transmission of data at very high speeds; and promote the testing, trialling and demonstration of next generation applications, products and services. The Australian Government offers a range of generic programmes designed to foster innovation across all sectors of Australian industry.

National ICT Australia

The Government established its ICT Centre of Excellence, NICTA, as part of the first *Backing Australia's Ability* package. NICTA plays a major role in the Australian Government's policy to promote science and innovation. It is capitalising on Australia's extensive ICT talent through world-class research, commercialisation, education, and industry collaboration. NICTA's research efforts focus on the

technology challenges facing industry, community, and the national interest. Total funding over the five years to 2010-11 will be in the order of AUD 251.1 million

Information Technology Online

The Information Technology Online (ITOL) Program is an Australian Government funding programme designed to accelerate the national adoption of e-business solutions, especially by SMEs. Since its inception, ITOL has provided funding of approximately AUD 13.3 million to 119 collaborative projects.

New Industries Development Program

The New Industries Development Program (NIDP) aims to improve Australia's performance in the commercialisation of new, innovative agribusiness products, services and technologies. The programme's major focus is the commercialisation of market-driven solutions based on innovation. Under *Backing Australia's Ability* the NIDP was a 5-year programme with funding of over AUS 20 million to June 2006. The programme has been extended by AUD 14 million to June 2011 through the *Backing Australia's Ability – Building our Future through Science and Innovation* package. Use of the funds will include: competitive-based funding assistance for pilot commercialisation projects to 'incubate' innovative niche agribusiness ventures; competitive-based scholarships to enable emerging managers to gain first hand experience in specific areas of business management and new markets; and further development of supply chain management and market analysis initiatives aimed at changing attitudes, building understanding of what investors are seeking and providing new businesses with access to commercial skills.

Food Centres of Excellence

The Food Centres of Excellence programme is an Australian Government funded initiative under the National Food Industry Strategy. The programme will provide almost AUD 12 million over 5 years (to June 2007) to develop world-class capability in Australian food R&D centres and contribute to better co-ordinating Australia's food R&D efforts. Improved capability will encourage innovation in food product, process and systems development. {http://www.nfis.com.au}

2. Policy changes in programmes to support R&D and innovation in SMEs and new technology-based firms.

- As noted below, a review of Australia's venture capital industry is currently underway.
- The Commercial Ready programme aims to stimulate greater innovation and productivity growth in the private sector by providing around AUD 200 million per year in competitive grants to SMEs between 2004-05 and 2010-11. A wide range of project activities can be supported, extending from initial R&D, through proof of concept, to early-stage commercialisation activities.
- The National Innovation Awareness Strategy – Industry, Tourism and Resources programme is an AUD 13.9 million programme under the *Backing Australia's Ability* initiative which was designed to help build a culture that appreciates and rewards innovation and entrepreneurship. The National Innovation website was launched in November 2004 to promote the benefits of innovation to SMEs and young Australians and to identify innovation programmes that will assist individuals and businesses (www.innovation.gov.au).

3. Major shifts or changes in the mix of instruments used to provide public support for private sector R&D and innovation. Shifts in the policy mix anticipated in coming years.

Strategic Framework for the Information Economy

Released in July 2004, *Australia's Strategic Framework for the Information Economy 2004-2006 – Opportunities and Challenges for the Information Age* provides the policy platform to address new challenges to Australia's position as a leading information economy. It replaced '*A Strategic Framework for the Information Economy – Identifying Priorities for Action*', which was adopted by the Australian Government in 1998.

The SFIE sets out four key priorities and sixteen supporting strategies that focus on a whole-of-government agenda to ensure the ongoing development of Australia's information economy. The four priorities are:

Priority 1. Ensure that all Australians have the capabilities, networks and tools to participate in the benefits of the information economy.

Priority 2. Ensure the security and interoperability of Australia's information infrastructure and support confidence in digital services.

Priority 3. Develop Australia's innovation system as a platform for productivity growth and industry transformation.

Priority 4. Raise Australian public sector productivity, collaboration and accessibility through the effective use of information, knowledge and ICT. {http://www.dcita.gov.au/ie/framework}

Recent developments in Australia's system of copyright law

The introduction of a new ISP liability scheme, the extension of the term of copyright protection and enhanced criminal sanctions are recent changes to Australia's system of copyright law that have direct relevance to Australia's ICT industries. The changes commenced on 1 January 2005 and were introduced in order to implement Australia's obligations under the AUSFTA. Also of note is Australia's remaining obligation under the Agreement to amend the technological protection measure provisions and the Government's current review of whether Australian copyright law should include an exception to infringement based on the principles of 'fair use'.

ISP Liability Scheme

Australia introduced a scheme which limits the remedies available against ISPs (or 'carriage service providers' as defined in the legislation) where they have been found liable for copyright infringements that occur on their systems or networks. The new scheme provides that, subject to compliance with certain conditions, ISPs cannot be the subject of court orders for monetary remedies, such as damages or an account of profits, where they have been found liable for copyright infringements that take place on their systems and networks.

Copyright Term Extension

Australia has extended the duration of copyright in works (including computer software), sound recordings and films by 20 years to the life of the author of the works plus 70 years and 70 years from publication of sound recordings and films. The change applies to future materials and all existing materials

still in copyright on 1 January 2005. Material that was already in the public domain at that date was not returned to copyright protection.

Enhanced Criminal Sanctions

As part of the AUSFTA, Australia introduced amendments to the criminal provisions in the *Copyright Act 1968* to make it clear that infringements for commercial advantage or profit are explicitly covered. The criminal provisions were also broadened to include infringements that have a significant prejudicial impact on the owner of the copyright. A new criminal provision was incorporated for the unauthorised distribution and importation of rights management information for commercial advantage or profit. A corresponding civil remedy has also been introduced.

Technological Protection Measures (TPM)

Currently, the *Copyright Act 1968* provides civil remedies and criminal sanctions against the manufacture of, and the dealing in, devices used to circumvent TPM. The obligations in the AUSFTA require Australia to strengthen its laws in this area. Legislation implementing TPM obligations and outcomes of a TPM review are to be completed by 1 January 2007.

Fair Use Review

Australia's current copyright laws include exceptions for fair dealing, which allow copyright material to be used for specific purposes provided the dealing is 'fair' in the circumstances. These purposes are limited to research and study, criticism and review, reporting the news and the provision of legal advice. The Government is reviewing whether an exception or specific exceptions to copyright based on principles of 'fair use' should be adopted to make copyright law more flexible and appropriate in the digital age as well as promoting and supporting mechanisms underpinning innovation, research and development activity.

Recent information about the system of industrial property protection in Australia

The Advisory Council on Intellectual Property has recently conducted a review of business method patents, and has recommended that no changes should be made to Australian legislation in respect of patentable subject matter. The Government has accepted this recommendation. Therefore patents for business processes (including ICT-based business processes) will continue to be assessed against the same patentability criteria as apply to other fields of technology.

The AUSFTA that was concluded last year did not oblige Australia to make any alterations to how patents for ICT/software innovations are treated.

Looking to the future, issues that policy makers will need to address regarding support to the business innovation system; Efforts that have been taken to identify or address them.

'Innovation in Australian Business' Survey

The results of the 'Innovation in Australian Business' Survey undertaken by the Australian Bureau of Statistics in 2003 found that industry innovation expenditure is not primarily based on R&D and that non R&D innovation expenditure represents 69% of innovators expenditure on innovation.

A future focus of policy makers will be to further develop our understanding of non R&D related innovation within Australian industry and ramifications for government policy and programmes.

Venture capital industry review

A review of Australia's venture capital industry is currently underway and is exploring:

1. Assess the level and sources of venture capital and later stage private equity investment, including historical trends and growth prospects. The Review should identify factors that might impact on levels of Australian venture capital and later stage private equity investment including, but not limited to, the availability of suitable investment opportunities, the accessibility and liquidity of Australian equity markets and proximity to global capital and product markets.
2. Determine whether there are any impediments to the efficient operation of the venture capital and later stage private equity market and, on this basis, determine whether government intervention is warranted.
3. Consider the appropriateness, effectiveness and efficiency of existing Australian Government support for venture capital and later stage private equity investment, in the context of a thorough review of the industry, including:
   - The Pooled Development Funds (PDF) Program – paying regard to the issues and recommendations raised in the PDF Registration Board's report "Financing Australian SMEs".
   - The Venture Capital Regime including venture capital limited partnerships.
   - Other programmes including Innovation Investment Funds, COMET and the Pre-seed Funds.

   Where feasible, the Venture Capital Review Expert Group may wish to identify features of government intervention by other countries to determine their effectiveness, usefulness and relevance to Australia.
4. Determine the impact of venture capital (and later stage private equity) activity on the Australian economy.

The review is due to report to government in early 2006.

ICT R&D Priorities

The National Research Priorities include ICT and ICT-related goals such as Frontier Technologies for building and transforming Australian industries and Safeguarding Australia. The Australian Government has made a commitment to work with industry to identify a series of priority areas for ICT development, which build on the National Research Priorities and promote the development of Australia's strategic competitive advantages in the context of global opportunities. Through consultations with key stakeholders, the Government will formulate priorities to guide industry, researchers and Government and catalyse the sustainable development of Australian ICT capabilities so that they are world class.

ICT Framework

The ICT Framework for the Future report, *Enabling our Future*, was released on 15 April 2003. The Framework report focuses on key elements in the innovation infrastructure that will support the longer-term development of the ICT industry and the growth of a national ICT capability. It provides a blueprint that builds on the substantial foundations put in place by the Australian Government in recent years, including the *Backing Australia's Ability* packages, support for ICT start-up companies, recent reforms to the taxation of risk capital and other Government initiatives.

The framework in *Enabling our Future* maintains, and where appropriate strengthens, policy settings to provide a long-term consistency of approach, improved coordination of ICT-related initiatives and better integration of ICT into national research infrastructure. As part of the ongoing development process, the framework was reviewed in 2003 and 2004 to identify new and emerging issues.

{http://www.dcita.gov.au/ict/publications/data_magazine/issue_6/data_issue_6_-_enabling_our_future}

Section D: Enhancing collaboration and networking among innovating and research organisations

1. Major initiatives to promote collaboration and networking among innovating firms.

CSIRO National Flagships Initiative

The Australian Government is providing an additional AUD 305 million over seven years from July 2004 to the CSIRO to enable the development of large-scale collaborative research partnerships which reflect the National Research Priorities.

Flagships are large-scale collaborative partnerships which link CSIRO with organisations across Australia to research areas of national need. The six Flagships and their goals are:

- Preventative Health – To improve the health and well-being of Australians and save AUD 2 billion in annual direct health costs by 2020 through the prevention and early detection of chronic diseases.
- Food Futures – To transform the international competitiveness and add AUD 3 billion annually to the Australian agrifood sector by the application of frontier technologies to high-potential industries.
- Light Metals – To lead a global revolution in light metals, doubling export income and generating significant new industries for Australia by the 2020s while reducing environmental impact.
- Water for a Healthy Country – To achieve a tenfold increase in the social, economic and environmental benefits from water use by 2025.
- Energy Transformed – To halve greenhouse gas emissions and double the efficiency of the nation's new energy generation, supply and end use, and to position Australia for a future hydrogen economy.
- Wealth from Oceans – To position Australia by 2020 as an international benchmark in the delivery of economic, social and environmental wealth based on leadership in understanding ocean systems and processes.

2. Major policy initiatives to promote stronger industry-science relationships.

Backing Australia's Ability – Building Our Future Through Science & Innovation increased the public policy emphasis on commercialisation through a range of programmes (shared across Education, Science and Training & Industry Departments) targeted at supporting businesses and research institutions as they take the results of research and transform them into marketable products, services and processes. About one third of the AUD 5.3 billion funding for the package relates to commercialisation.

The Research Quality Framework, announced in May 2004 by the Australian Government as part of *Backing Australia's Ability – Building our Future through Science and Innovation*, aims to measure the quality and impact of research conducted in universities and publicly funded research agencies, as well as its benefits to the wider community (the RQF is described above in Section B).

Linkage Projects

The *Linkage Projects* scheme, which is administered by the ARC, supports collaborative research projects between higher education researchers and industry and other partner organisations. In 2005, the

funding rules for the scheme were changed to allow the possibility of funding levels above the previous maximum of AUD 500,000 per annum, where proposals are highly competitive and partner organisations pledge a large cash contribution. The change was introduced to enable partner organisations (including industry) to enter into larger co-investment research partnerships with universities.

Cooperative Research Centres

The CRC programme represents one of the most notable public/private partnerships for research and innovation, and has recently been the main subject of a country level study by the OECD on public private partnerships. This study took a closer look at the CRC programme, focusing on issues such as: governance and legal structure; financing; human resources; intellectual property management; evaluation of individual centres and of the programme as a whole.

The study concluded that overall the programme has been successfully achieving its four original objectives relating to research excellence; effective collaboration; creation of new educational opportunities; and the translation of research outputs into economic, social and environmental benefits to Australia. The study identified aspects of the programme design and management features that have contributed most to this success, notably:

- The open-ended, long-term commitment by the government.
- The equal emphasis on all four major programme objectives (research, collaboration, education, application of outcomes).
- A consistent, transparent and open application and selection process.
- An effective governance structure at the programme level and a clear management structure at the centre level; and
- A rigorous monitoring and evaluation process.

The OECD Study concluded that the CRC programme 'has proved an inspiring model for subsequent initiatives in several OECD countries' (http://www.oecd.org/dataoecd/49/16/25718007.pdf). During 2003, the CRC programme was reviewed, and the 2004 Selection Round focussed more strongly on commercialisation and utilisation of research. The 2006 Selection Round Guidelines have retained the stronger focus on contributing to economic growth.

{https://www.crc.gov.au/Information/ShowInformation.aspx?Doc=Selection_rounds&key=&Heading=}

ARC Centres of Excellence

In addition to, and as the result of additional funding for the National Competitive Grants Program under *Backing Australia's Ability*, ARC Centres of Excellence are being established to create the scale and focus necessary to maintain and develop Australia's international standing in areas of national research priority identified by the Government. These Centres are serving as points of interaction among higher education institutions, governments, industry and the private sector generally. Through highly innovative research that addresses challenging and significant problems within the priority areas they are building national research capability and producing outcomes of economic benefit to Australia.

e-Research Support

In 2005, *e-Research Support* was established as a pilot initiative under the ARC's *Special Research Initiatives* scheme to overcome barriers to the adoption of e-Research methods across all research

disciplines by encouraging open exchange of information, sharing of resources and better use of existing ICT infrastructure. In 2005–06, funding of AUD 3.6 million will support 37 research projects under *e-Research Support*.

3. Policy shifts in recent years in support of different channels of industry-science linkages. Anticipated shifts or changes in policy for strengthening industry-science linkages.

Partly as a consequence of the development of a proposed Research Quality Framework (see Section B), in June 2005 the former Minister for Education, Science and Training initiated a debate on the question of 'third stream funding' for Australian universities. Since then there have been various proposals and suggestions on the need to enhance policy and funding for knowledge transfer and industry-research engagement, but there are no specific plans for policy or programme changes as yet.

Section E: Globalisation

1. Important policy issues and objectives with respect to the process of internationalisation of R&D.

The Australian Government recognises that many of the scientific challenges facing modern nations, for example security and climate change, are global rather than national and need to be tackled collaboratively. The scale of some modern science and the cost of some of the sophisticated equipment required, such as telescopes, particle accelerators, high intensity neutron and X-ray sources, are beyond the means of individual nations, making collaboration essential.

Recent developments in information and communications technology that allow the acquisition, storage and manipulation of vast amounts of data and the instantaneous sharing of that data between geographically distant collaborators has fuelled and accelerated international collaboration. International engagement helps Australian researchers keep in touch with the latest developments in their fields and enables access to the world science needed for economic growth, social development and environmental sustainability.

For instance, the Bureau of Meteorology has identified the international system of collaboration sponsored by the World Meteorological Organisation and the Intergovernmental Oceanographic Commission of UNESCO as fundamental to its field. Data exchange mechanisms and related policy are critical to the Bureau's operational systems and research. A Memorandum of agreement developed with the United States of America's National Oceanic and Atmospheric Administration under the Science and Technology Agreement for the United States of America in Australia is currently awaiting signature.

With its small, dispersed population and geographical isolation from the science centres of North America and Europe, Australia faces particular challenges. The Australian Government provides specific support for international science linkages (see below) over and above the funding to research organisations and universities.

2. Changes in policies to attract R&D through foreign direct investment.

- X Direct financial support
- X Fiscal incentives (tax breaks, R&D tax credits …)
- ☐ Administrative support
- ☐ Provision of infrastructure
- ☐ Public procurement

X Active recruitment of foreign firms

☐ Advertising

☐ Other measures

Australian Government policies to attract new R&D activities into Australia include direct financial support, fiscal incentives and the active recruitment of foreign firms.

Direct Financial Support

Direct financial support may be available to firms seeking to establish R&D facilities through foreign direct investment, in limited circumstances.

Invest Australia is an Australian Government agency that, since 1997, has worked to attract productive foreign direct investment in Australian industry by promoting Australia's competitive advantages as an investment destination and actively facilitating investment projects into Australia. The National Strategic Framework recognises that foreign direct investment projects can contribute to increased R&D effort in Australia, including in (but not limited to) areas of Australia's National research Priorities. The introduction of new technology is also recognised as being an important element in the Government's role of helping attract foreign direct investment.

The Australian Government will consider the provision of investment incentives to strategic investment projects in limited and special circumstances where the project would generate significant net economic and employment benefits for Australia. Incentives could include grants, tax relief or the provision of infrastructure services. Incentives are considered on a case by case basis, taking into account a published set of eligibility criteria. The criteria include a requirement that the investment would not be likely to occur in Australia without the incentive, is viable without subsidy, and provides significant net economic benefits for Australia.

Fiscal Incentives

The R&D Tax Concession and the Commercial Ready programme are open to eligible Australian-registered companies, including subsidiaries of foreign-owned companies. Many foreign-owned Australian-registered companies are beneficiaries of the R&D Tax Concession.

Active Recruitment of Foreign Firms

Invest Australia identifies companies that may find Australia to be an attractive location in which to undertake R&D activities and then promotes Australia to them in an effort to attract investment.

3. Changes in the principles concerning the treatment of foreign firms or foreign research institutions in national R&D programmes.

Business R&D

There has been little change in the principles that govern the treatment of foreign firms or foreign research institutions within industry innovation programs since the last report.

4. Specific measures to support the internationalisation of domestic public research institutions.

- Two Australian Government programmes specifically aimed at encouraging international collaborations, providing support for Australia's researchers in universities and public research

organisations are the *International Science Linkages* (ISL) programme and the *Linkage International* scheme.

- The ISL programme, delivered by the Department of Education, Science and Training (DEST), is an initiative under *Backing Australia's Ability*. ISL provides AUD 92.7 million over nine years to 2011 to support Australian researchers from the public and private sectors to collaborate with international partners on leading edge science and technology. ISL builds on the former Innovation Access Programme – International S&T. {http://www.dest.gov.au/science/isl}
- ISL aims to assist Australian researchers to increase their participation in international leading edge scientific research, to leverage access to international research funds, to raise the profile of Australian research, and to support the development of strategic alliances between Australian researchers and international researchers and industry. The programme provides support on a competitive basis for a range of international collaborative science and technology projects and underpins Australia's international S&T agreements and its participation in multilateral cooperation programmes. To be supported, activities are required to address Australia's National Research Priorities.
- Under the ARC's *Linkage International* scheme, funding is provided to support the movement of researchers between Australian research institutions and centres of research excellence overseas through two mechanisms – Fellowships and Awards. ARC International Fellowships fund outstanding postdoctoral, research or senior research fellows to work in Australian or overseas institutions. *Linkage International* Awards provide funds for Australian-based researchers to participate in joint research projects with overseas researchers, establishing new collaborations, strengthening on-going collaborations and providing international research experience for early career researchers.

Other Australian Government sponsored progammes to foster international collaboration among researchers in public research organisations include:

Australian-European Union Collaborative Research Grants

The NHMRC provides direct support for the participation of Australian researchers in the European Community Sixth Framework Program 2002–2006 (FP6). FP6 is an initiative designed to stimulate activities in the fields of science, research and innovation and is the European Union's main instrument for funding research in Europe. The researchers supported by the Australian–European Union Collaborative Grants are members of teams selected for funding under FP6 in the area of Life Sciences, Genomics and Biotechnology for Health. The budget for this area is EUR 2.2 billion, or about AUD 3.7 billion. The NHMRC provides AUD 1 million per call for FP6 grants.

Three programmes are currently funded to approximately AUD 500,000 awarded under the European Community Fifth Framework Program 1997–2001 and two programmes are funded to AUD 1.2 million under FP6. The supported research included: developing therapeutic cancer vaccines and investigating the epidemiology of Human Papilloma Virus infection and ultraviolet radiation in relation to non-melanoma skin cancer.

Human Frontier Science Program

The internationally renowned Human Frontier Science Program (HFSP) promotes fundamental research in the life sciences with special emphasis on novel and interdisciplinary research, international (with an emphasis on intercontinental) collaboration and support for young investigators.

The NHMRC took the lead in applying for Australia to become a Management Supporting Party of the HFSP. The membership application to the programme, which was accepted by the HFSP Board in December 2004, was supported by the United Kingdom Medical Research Council and the Canadian Institutes of Health Research. Membership of the programme will enable Australian researchers to apply for grants as principal investigators from the HFSP's annual budget of approximately USD 53 million.

International Collaborative Research Grants

The International Collaborative Research Grants scheme is a three-way arrangement amongst the Wellcome Trust (United Kingdom), the NHMRC and the Health Research Council of New Zealand. The scheme is designed to foster collaborative research between Australia and New Zealand and other countries of the region. It provides funding for teams of researchers from South and South East Asia and the Pacific region to undertake collaborative projects on health issues of regional importance.

The single round of funding in 2004 awarded 11 grants amounting to about AUD 30 million over the next five years. The NHMRC contributed AUD 11 million for Australian collaborations in the funded programmes, the Wellcome Trust AUD 14.7 million and the Health Research Council of New Zealand AUD 3.3 million. Collaborators receiving grants from the Wellcome Trust are working in regional countries including India, China, Sri Lanka, Tonga and Fiji.

Juvenile Diabetes Research Foundation (JDRF)

The JDRF is the leading charitable body in the world that funds, and advocates on behalf of, research on juvenile or type 1 diabetes. The NHMRC is proud of its longstanding association with the JDRF, with which it first established partnership programmes in 1996. Jointly-funded initiatives now under way include:

- establishment of the *Diabetes Vaccine Development Centre* to conduct research toward developing a vaccine or preventive immunotherapy for type 1 diabetes. Between 2003 and 2005, the Centre will receive AUD 5 million from JDRF matched by AUD 5 million from the NHMRC.
- seven *Special Program Grants in Type 1 Diabetes*, each of which funds a large research programme. JDRF contributes AUD 17.6 million to these grants and the NHMRC's commitment is AUD 7.5 million between 2001 and 2005.

Tripartite Agreement with the Canadian Institutes of Health Research and the Health Research Council of New Zealand

In 2002, the NHMRC entered into a tripartite agreement with the Canadian Institutes of Health Research and the Health Research Council of New Zealand to support research into improving the health of Indigenous peoples of the three countries. The agreement acknowledges the need to respond to priorities for health development in each country. The agreement will foster cooperation between governments, institutions, researchers and indigenous peoples to gain a better understanding of factors that determine the health of indigenous populations.

Knowledge gained will inform the introduction of measures designed to improve the health of indigenous peoples. An important outcome of the agreement will be the sharing of information in areas including research methodology, ethical conduct of research, community engagement and transfer of research outcomes and capacity. The agreement will facilitate international collaborative research programmes by encouraging direct links between researchers and organisations in the member countries.

An early initiative of the tripartite agreement is the International Collaborative Indigenous Health Research Partnership (ICIHRP) grant on resilience. The focus of the grant, resilience, was chosen as a broad theme because it covers the life cycle, from childhood through adolescence to adulthood. The concept of resilience can be applied to both the identification of intervention points at various stages of life and specific health issues that are over-represented among indigenous peoples. The research under ICIHRP will examine the basis of good health throughout the life span of indigenous peoples. Canada, New Zealand and Australia have each committed AUD 10 million to this initiative. Seeding grants commenced on 1 July 2005.

Projects under Australia's Bilateral Climate Change programme

In 2004-05, the Australian Government committed additional funding to underpin Australian climate change action at the international level. In particular, AUD 5.1 million was allocated over 2004-2008 specifically for developing and implementing bilateral partnerships and projects that deliver mutual practical benefit for Australia and partner countries and help build the capacity of developing countries to take action on climate change. These activities are implemented through the Bilateral Climate Change Partnerships Programme, which supports and complements Australian Government programmes and activities under the United Nations Framework Convention on Climate Change. Arrangements for bilateral cooperation have been in place with the United States and Japan since 2002, and with China, New Zealand and the European Union since 2003.

The Bilateral Climate Change Partnerships Programme has the potential to result in greater efficiencies and reduced costs for Australia and the bilateral partners through sharing of experience, expertise, data and resources, and enhancing the exchange of research and technologies. Research and development priorities are theme-based and are identified for each bilateral partnership. The projects under the programme, primarily in climate change science research in forestry, land management and renewable energy, will reduce greenhouse gas emissions, preserve carbon sinks and improve our understanding of the wider impacts of climate change. Support is provided to projects through facilitated contact with government agencies and officials in partner countries, access to bilateral partnership events, assistance in identifying potential collaborators in partner countries, and project grants for collaborative work in developing countries. {http://www.greenhouse.gov.au/international/partnerships/bccpp.html}

Australian Tsunami Warning System

The ATWS (see Section B) is an example of an initiative in which specific measures have been introduced to enhance international collaboration.

Bureau of Meteorology

The Bureau of Meteorology continues to use extensive international collaboration as a way of introducing innovative technology for its systems. The Bureau is a net importer of technology to meet national requirements, but at minimal cost because of the collaborative nature of meteorology and related disciplines.

5. Measures to link domestic firms, in particular SMEs, to foreign sources of research and innovation, including international co-operation in R&D.

The Australian Government supports international R&D co-operation between Australian and foreign firms through specific measures or programmes and through providing Australian businesses with the support to link up with international partners. SMEs can potentially benefit from links to CRCs that have international research or development links.

Specific Measures

The Australian Government specifically supports international R&D co-operation between Australian and foreign firms through its membership in the Intelligent Manufacturing Systems multilateral manufacturing and collaborative R&D initiative. This is a programme of industry-led, international collaboration in advanced manufacturing to develop the next generation of manufacturing and processing technologies. Companies and research institutions from Australia, Canada, the European Union and Norway, Japan, Korea, Switzerland, and the United States of America participate in the programme. {http://www.ims.org}

Support to Find International Partners

Support to businesses to find international partners is available through Invest Australia, the Australian Government's inward investment agency. Invest Australia works with Australian companies seeking foreign investment to introduce them to potential foreign partners in a number of ways including investment missions, conference participation, investment seminars and capability promotion. {http://investaustralia.hyperlink.net.au/}

Section F: Human resources

1. Recent efforts to improve supplies of university graduates with science and engineering degrees (both quantity and quality).

X Raising interest in and awareness of science among youth;

☐ Revising academic curricula to make science and technology more attractive to students, such as by expanding interdisciplinary training in S&E education;

☐ Improving teaching in mathematics and science, including through the use of ICT in teaching content and delivery;

X Reducing gender and ethnic minority gaps in science and technology education

X Enhancing financing opportunities for PhD study and post-doctorate training (such as through fellowships, funded research opportunities, *etc*.)

☐ Improving the quality of secondary university research laboratories/infrastructure

☐ Demand-side policies to increase the attractiveness of employment in public research organisations, make public sector employment more flexible, or improve provision of information to students regarding job opportunities in the public and private sectors.

X Other

Building public awareness of the economic, social and environmental contributions of, science and technology; enhancing public appreciation of Australia's scientists and science teachers; and encouraging younger people to consider entry into science-based careers

The Australian Government encourages public understanding and support for the major role that science, engineering and innovation play in maintaining and enhancing our economy, society and environment. Initially these objectives were pursued through the science awareness component (AUD

17.32 million) of the National Innovation Awareness Strategy (NIAS), an AUD 31.3 million programme which was funded under *Backing Australia's Ability* (2000-01 – 2005-06).

Under *Backing Australia's Ability – Building Our Future through Science and Innovation*, NIAS' science awareness programmes are being continued and expanded under the Science Connections Programme (SCOPE), which has funding of AUD 25.8 million over the seven years 2004-05 to 2010-2011. {http://backingaus.innovation.gov.au/2004/skills/sci_connection.htm}

SCOPE:

- Encourages public recognition of the achievements and contributions made by our scientists and science teachers through the Prime Minister's Prizes for Science (https://sciencegrants.dest.gov.au/SciencePrize/Pages/Home.aspx);

- Supports National Science Week through project grants and partnership arrangements with organisations such as the Australian Science Teachers Association and CSIRO Education;

- Sponsors three Eureka Prizes for science communication: Promoting Understanding of Science, Science Journalism and the Eureka People's Choice Award (http://www.amonline.net.au/eureka/);

- Financially supports several of the Australian Broadcasting Corporation's (ABC's) Science Online programmes, accessed through "The Lab" (http://www.abc.net.au/science/) – these include "News in Science" and the "Surfing Scientist" – and ABC science outreach initiatives such as Café Scientific;

- Provides enabling finance to:

  - the Science and Mathematics Olympiads programmes for secondary school students;

  - the Australian Museum's flagship "Science in the City" programme;

  - the University of Newcastle's successful "Science and Engineering Challenge" programme for middle secondary school students;

  - Engineers Australia's "EngQuest" programme for primary school students; and

  - "Science meets Parliament", an annual two-day event where parliamentarians and scientists meet in forums and smaller groups to discuss current issues of national importance (http://www.fasts.org/Fsite/SmP/SmP.htm).

A nationally touring science and innovation outreach programme designed for secondary students, "Smart Moves" promotes the further study of science and engineering by providing outstanding examples of Australian scientific research, and inspirational case studies of Australian entrepreneurial achievements. "Smart Moves" also offers students the opportunity to nominate for the Invention Convention (http://smartmoves.questacon.edu.au/smart_moves/phase3.asp) and provides links to a number of science competitions, extension programmes and teaching resources. {http://smartmoves.questacon.edu.au/index_flash.asp}

Under *Backing Australia's Ability – Building Our Future through Science and Innovation*, the Questacon Smart Moves programme, which began in 2001, is being continued through to 2010-2011, with an extra AUD 11.4 million funding allocated over seven years, building upon initial funding of AUD 3.7 million under *Backing Australia's Ability*.

Reducing gender and ethnic minority gaps in science and technology education

The Australian Government convened a "Participation Summit" on 22 September 2005 to identify and address the barriers to women, young people and men participating in the Australian ICT sector. Approximately 80 senior industry, education and government representatives attended.

The Summit identified a range of initiatives to improve the availability of ICT skills, through promoting participation by women and men in the ICT profession and by encouraging young people to enter the profession.

The Summit considered that curriculum design and careers advice at school, in the Vocational Education and Training sector and tertiary levels were critical to encouraging young people into the ICT profession. The Summit noted that there were many substantial ongoing initiatives in this area in Australia, including secondary and tertiary curriculum design and professional development of teachers, which were improving awareness of ICT and providing advice on the range of ICT careers opportunities.

The Summit recognised the desirability of sharing the experience of these initiatives to promote appropriate curriculum design and careers advice at secondary and tertiary level and of exploring this through innovative networked-based approaches.

The Summit also recognised the need for improved linkages between ICT education at all levels and industry to help ensure more effective education and a better understanding of what a career as an ICT professional entails.

The Australian Government will be progressively implementing Summit outcomes, including seeking support from key stakeholders in all levels of government, industry and the education sector.

Enhancing financing opportunities for PhD study and post-doctorate training

To maintain an adequate supply of researchers, the Australian government, through CSIRO, NHMRC and the ARC, enhances its financial support for a variety of postdoctoral fellowships for early career researchers to develop appropriate research skills.

In 2005, the ARC provided support for research training and career development through a number of elements of the National Competitive Grants Program.

Discovery Projects supports fellowships at the postdoctoral, established researcher and senior researcher levels – respectively, Australian Postdoctoral Fellowships (APDs), Australian Research Fellowships/Queen Elizabeth II Fellowships (ARFs/QEIIs) and Australian Professorial Fellowships (APFs). In 2005, a total of 167 new Fellowships were awarded under *Discovery Projects*, comprising 112 APDs, 32 ARFs/QEIIs and 23 APFs. In addition, 747 applications from early-career researchers to lead research projects as Chief Investigators were received of which 171 were successful. This represents a commitment to these leading early-career researchers of AUD 13.3 million in 2005.

Five new grants were awarded under *Discovery Indigenous Researchers Development*, with funding of AUD 464,932 in total over two years. The grants include two cadetships to enable Indigenous researchers who have completed their doctorate studies to establish research track records strong enough to equip them to compete for Australian Postdoctoral Fellowships.

Linkage Projects fosters opportunities for postgraduate researchers to pursue internationally competitive research in collaboration with industry and other partner organisations. In 2005 the ARC awarded 389 Australian Postgraduate Awards (Industry), including 57 targeted to research in the field of

information and communications technology. This brought the number of new awards over the four years 2002 to 2005 to 1673. In addition, to establish collaborations at a more senior level, 33 Australian Postdoctoral Fellowships (Industry) and three Linkage Industry Fellowships were awarded in 2005.

In addition to the direct support provided by research fellowships, the ARC supports research training and career development indirectly under *Discovery Projects* and *Linkage Projects* grants (which in many instances provide support for postgraduate students) and Linkage International Awards (which enable many postgraduate and postdoctoral researchers to establish and build their international research networks). Research Centres funded by the ARC provide high-quality environments in which research training and career development is supported.

CSIRO aims to increase the number of its postdoctoral appointments to 450 appointments by 2007/08. The number of postdoctoral staff has increased from 183 at June 2002 to 288 at June 2005. The CSIRO postdoctoral programme, established in October 2001, aims to support 25 postdoctoral fellowships each year with emphasis on new areas of science and collaborative proposals, and has granted 60 awards to date. {http://www.csiro.au/csiro/content/standard/pps6i,,.html}

The NHMRC supports some 2500 people under 'People Support' mechanisms, including: fellowships; career development awards; industry fellowships; training fellowships; and training scholarships. The grants support researchers or potential researchers at various stages of their careers. The total number of the grants to individual researchers increased from 862 for the 2004 round to 1054 in the 2005 round. The grants awarded totaled AUD 105.9 million in the 2005 round, up from AUD 94.1 million in the 2004 round. These support mechanisms provide a career structure for health and medical researchers in Australia who are at internationally competitive levels.

{http://www.nhmrc.gov.au/funding/funded/outcomes/index.htm}

Other

- Research activities funded under the CERF Program are expected to include provisions for fostering and enhancing Australia's research capacity, including the provision of high quality research training and skills opportunity through, for example, the provision of postgraduate training. In addition, plans are underway for the establishment of a discrete CERF Fellowships component, though specific arrangements (for example, PhD study, post-doctorate or established researcher) have yet to be finalised.

2. Recent policy changes to enhance the international mobility of scientific and high-skilled personnel, including programmes to attract foreign (and expatriate) talent and encourage students/workers to gain international experience.

X Changes in immigration legislation;

X Funding of scholarships, grants for international mobility of students/scholars;

☐ Creation of special positions at universities or public research centres;

☐ Fiscal incentives (*e.g.*, income tax breaks) for foreign workers

X Programmes to promote return migration of expatriate students, scientists and engineers

☐ Other measures

Changes in immigration legislation

On 1 November 2005, changes to the Migration Occupations in Demand List provided Australian employers and industry access to a wider range of skilled workers including mining engineers, petroleum engineers, chemical engineers and dental specialists.

Funding for international mobility of students/scholars and the return migration of expatriate students, scientists and engineers

In 2005, it was announced that the *Federation Fellowships* scheme would be extended beyond the five years initially identified when the scheme was established in 2002. The Fellowships provide salaries of AUD 246,290 (2005 dollars) (plus 26% on-costs) per annum for five years. Open to applications from outstanding international researchers, the *Federation Fellowships* scheme particularly encourages applications from Australian and non-Australian researchers currently working overseas. A preference is given to early- to mid-career researchers who will play a leadership role in building Australia's internationally competitive research capacity. In 2005, the ARC awarded 24 Federation Fellowships including four to Australians returning from overseas and five to foreign nationals moving to Australia.

{http://www.arc.gov.au/apply_grants/discovery_federation.htm}

3. Recent policy efforts to foster development of specific skills other than S&T skills needed to foster innovation in a knowledge-based economy.

An audit to investigate science, engineering and technology (SET) skills in Australia was commissioned in August 2004. The audit is informed by an industry survey and case studies, a youth attitudes survey towards SET study and careers, a consultant's report examining the impact of international policy developments on the future supply of SET skills in Australia, and a literature review.

The audit is being overseen by a high level Steering Committee which has broad representation across the peak bodies of the sector. Three Steering Committee meetings have been held to date, and a final one may be held in February 2006. A comprehensive consultative process involving public consultations across states, written submissions and research and analysis of labour markets have been central to this initiative.

In response to concerns expressed by industry representatives and the academic research community, the key issues addressed by the audit included:

- The supply of and demand for SET skills;
- The extent to which these skills are being met by the education sectors;
- Trends relating to SET skills; and
- The potential impacts of international developments on SET skills in Australia.

Participation in science, engineering and technology:

- Participation in SET is static or declining in schools, VTE and higher education at the same time that Australia is experiencing employment and population growth.
- Data on SET participation in schools, VTE and higher education showed that participation in enabling sciences is static or in decline as a proportion of total enrolments. Participation in 'easy maths' in Year 12 appears to be rising in most States.
- Recent higher education entrants in SET have lower tertiary entrance scores than those in other subject areas.

- Submissions, consultations and other research suggested that these trends are influenced by the following factors:
  - limited appeal of SET subjects and careers, and a lack of well-qualified and inspirational teachers in schools;
  - the wide range of subject choice available in Year 12;
  - poor understanding of SET career options by students;
  - differences in Higher Education Contribution Scheme fees between disciplines; and
  - competition posed by other career paths, e.g. medicine and law, which have high media public profiles.

School career counselling:

There was a strong view in submissions and consultations that school teachers and career counsellors have a poor understanding of SET career options. Submissions and consultations suggested that such limitations mean that students may be steered away from participation in SET study and careers.

Skills shortages in engineering:

Submissions, consultations, case studies and data analysis suggested that there are significant recruitment difficulties within most engineering disciplines, at all skill levels. This is exemplified by:

- wages and salaries for engineering positions rising more rapidly than those for other professions; and
- substantial unfilled vacancies across Australia in resources, civil and manufacturing engineering. The Department of Defence expressed concern regarding recruitment difficulties and losses of skilled labour, especially in skilled occupations relating to shipbuilding and defence material supplies.

Skills shortages in science:

- Research identified significant shortages of geologists, geoscientists, taxonomists, entomologists, spatial scientists and industrial chemists.
- Salary pressures within the sciences are less obvious than in engineering, as researchers are generally paid significantly less than those in industry, and scientists are more concentrated in research while engineers are more concentrated in industry.

Career paths for early-career researchers:

- Career paths were viewed as uncertain for early-career researchers (particularly for women) as positions are generally funded through short-term grants; and
- Early-career researchers are poorly paid by domestic and international standards.

The above factors may drive many early career researchers overseas, especially given the more relaxed attitudes to skilled migration in OECD countries, pressure for increases in R&D in OECD countries and the need to replace ageing SET workforces in OECD countries.

Industry Survey:

- The industry survey used a questionnaire developed with the Australian Bureau of Statistics (ABS). The sample for the survey was developed from the ABS Business Register. Questionnaires were sent to approximately 6,500 organisations.

- The survey received more than 3,000 responses representing a response rate of 52 per cent - 2 per cent above target.
- The survey showed significant recruiting difficulties in engineering skill sets at all levels, as demonstrated by lengthy recruiting periods and the fact that "other employers" were cited as the main source of recruits. Respondents indicated skill needs were one of their major concerns.
- To obtain a more in-depth understanding of the demand for science, engineering and technology skills, a number of case studies have also been conducted. The industries surveyed are spatial information, light metals casting, consulting engineering, biotechnology, finance, and scientific research organisations.

Youth Attitudes Survey:

- A telephone survey on youth attitudes to SET study and careers was carried out, focussing on:
  - background factors that influence subject choices;
  - respondents' interest in and perceived importance of learning science, maths and technology; and
  - influences on career choices.
- Respondent categories included year 10 students, year 11 and 12 students, and those who finished school in the last three years.
- The survey received 1,830 responses.
- The findings highlight the importance of socioeconomic factors, gender, parental education, and school type on the propensity to study SET subjects. They also highlight the influences of teachers, perceived career prospects and performance for encouraging interest in SET subjects. Life ambition, salary and work experience are the most important factors with regard to career choice.

4. Major shifts or changes in the priorities and mix of instruments used for developing human resources for innovation.

- Future policy directions are awaiting the outcome of the SET Skills Audit.
- Under *Backing Australia's Ability – Building Our Future through Science and Innovation*, funding continues for the extra 5470 higher education places in ICT, mathematics and science at Australian universities that were originally allocated under *Backing Australia's Ability* in 2001. Australian Government funding of AUD 199.5 million over five years from 2006-07 builds upon the AUD 151 million additional funding provided for the first five years of *Backing Australia's Ability*. {http://backingaus.innovation.gov.au/2004/skills/uni_places.htm}
- As noted above, in November 2005, changes to the Migration Occupations in Demand List provided Australian employers and industry access to a wider range of skilled workers including mining engineers, petroleum engineers, chemical engineers and dental specialists.

5. Changes anticipated in the supply and demand for human resources and the main policy challenges that policy makers will need to address; Efforts to identify future challenges or develop future policy directions.

In response to concerns expressed by industry representatives and the academic research community, the key issues addressed by the audit to investigate SET skills in Australia included:

- The supply of and demand for SET skills;
- The extent to which these skills are being met by the education sectors;
- Trends relating to SET skills; and

- The potential impacts of international developments on SET skills in Australia.

The audit findings, outlined above, constitute future policy challenges to be addressed.

Section G: Policy evaluation

1. Recent changes in policies regarding ex-ante or ex-post evaluation of innovation policies and programmes, including new legislation or regulations, methodologies employed, criteria considered and the organisations/institutions that perform the evaluations.

The *Backing Australia's Ability – Building Our Future through Science and Innovation* package announced in 2004 is the Australian Government's response to the three major reviews of the research system: the Evaluation of the Knowledge and Innovation reforms, the Closer Collaboration Review and the National Research Infrastructure Taskforce.

The Australian Government's response to the three reviews of the research system may be found at: http://www.dest.gov.au/sectors/research_sector/policies_issues_reviews/reviews/previous_reviews/government_response_to_research_reviews.htm.

2. Recent changes in policies regarding the evaluation of public research organisations, including legislation or regulations requiring evaluation, methodologies employed, criteria considered and the organisations/institutions that perform the evaluations.

As described in Section B above, the aim of the Research Quality Framework (RQF) initiative is to develop the basis for an improved assessment of the quality and impact of publicly funded research and an effective process to achieve this.

3. Significant changes in the priority given to evaluation in innovation policy, including the motivations for such changes and anticipated effects; Information about additional resources being invested in evaluation and approaches used to ensure that results of evaluation feed-back into policy making.

There have been no changes in the priority given to evaluation of innovation policy, in that it is considered an essential part of governance and implementation of policy. However, in 2005, the Australian Government agreed on a three tiered strategy for evaluating the whole *Backing Australia's Ability* (BAA) package, commencing in 2006. This will give an overall picture of the benefits of the innovation policy that commenced in 2001 and will be in place until 2011.

The first tier is a high level and independent evaluation of overall science and innovation support to be carried out in 2006-07, with a view to covering all key elements in the innovation system, including research and development. This should take account of any interaction with private support for science and innovation, and consider Australia's industrial structure. The study will report on the broader social, economic and environmental impacts of public support for science and innovation in Australia.

The second tier will be a whole-of-BAA evaluation of the AUD 8.3 billion package, after the high level study is finished. A draft BAA Outcomes Framework has been developed and will be populated with a range of agreed outcome measures that will capture short, medium and long term outcomes.

The third tier comprises the individual BAA programme reviews in accordance with normal processes for delivery and evaluation of BAA programmes across Government Departments.

It is understood that there will be difficulty in measuring the impacts and benefits of BAA. Innovation systems are complex and dynamic, and causality is difficult to establish. In addition, many benefits and impacts have long lead times. Various methods will be investigated, with a mix of qualitative and quantitative approaches, and short, medium and long term outcomes. In this way, strengths and weaknesses of the policy design can be used to inform future policy design.

4. Information or web-links, if available, about the outcomes of recent major evaluations of R&D or innovation policies.

- Previous reviews of the research sector may be located at: http://www.dest.gov.au/sectors/research_sector/policies_issues_reviews/reviews/previous_reviews/

As noted above:

- The *Backing Australia's Ability – Building Our Future through Science and Innovation* package is the Australian Government's response to the three major reviews of the research system: the Evaluation of the Knowledge and Innovation reforms, the Closer Collaboration Review and the National Research Infrastructure Taskforce. Details on the Australian Government's response to the three reviews of the research system may be found at: http://www.dest.gov.au/sectors/research_sector/policies_issues_reviews/reviews/previous_reviews/government_response_to_research_reviews.htm
- The Advanced Networks Program was subject to a mid-term review in 2003, available at: http://www.dcita.gov.au/__data/assets/file/10521/Advanced_networks_program_mid-term_review.pdf
- A review into the appropriateness, effectiveness, and efficiency of the Food Innovation Grants programme, published in November 2004, is available at: http://www.nfis.com.au
- The ICT Framework for the Future report, *Enabling our Future*, was reviewed in 2003 and 2004 to identify new and emerging issues. http://www.dcita.gov.au/ict/publications/data_magazine/issue_6/data_issue_6_-_enabling_our_future
- During 2003, the CRC programme was reviewed, and the 2004 Selection Round focussed more strongly on commercialization and utilisation of research. The 2006 Selection Round Guidelines have retained the stronger focus on contributing to economic growth. https://www.crc.gov.au/Information/ShowInformation.aspx?Doc=Selection_rounds&key=&Heading=
- An independent evaluation in 2003 assessed the Australian Climate Change Science Programme as being the core driver of Australian climate change science, and as highly effective and efficient, observing that the programme has supported a strong level of engagement in the international research effort. http://www.greenhouse.gov.au/science/accsp/