SUBMISSION No. 48

Australian Government

Department of Innovation
Industry, Science and Research

SUBMISSION TO THE HOUSE OF REPRESENTATIVES COMMITTEE ON INDUSTRY, SCIENCE AND INNOVATION

INQUIRY INTO INTERNATIONAL RESEARCH COLLABORATION

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TERMS OF REFERENCE

The House of Representatives Standing Committee on Industry, Science and Innovation shall inquire into and report on Australia's international research engagement, with particular reference to:

1. The nature and extent of existing international research collaborations;
2. The benefits to Australia from engaging in international research collaborations;
3. The key drivers of international research collaboration at the government, institutional and researcher levels;
4. The impediments faced by Australian researchers when initiating and participating in international research collaborations and practical measures for addressing these; and
5. Principles for supporting international research engagement.

SCOPE OF SUBMISSION

The Department of Innovation, Industry, Science and Research (the Department of Innovation) has policy and program responsibilities across a broad spectrum of science, research and innovation, ranging from basic research through to applied research and development (R&D) and commercialisation.

This submission will focus on portfolio support for international research collaborations in the public and private sectors. It will: provide information on the current level of support through policies and programs; provide a broad overview of the benefits of international research engagement; comment on the key drivers and impediments to collaboration; and identify some principles underpinning government support of international research engagement.

The portfolio science and research agency CSIRO also has extensive international research collaborations but is not included here as the organisation will make its own submission to the inquiry.

Other portfolio agencies - the Australian Research Council (ARC) and the Australian Nuclear Science and Technology Organisation (ANSTO) - will also make a separate submission.

INTRODUCTION

> Collaboration…is increasingly the engine of innovation. Australia has everything to gain from improving connections within the national innovation system and expanding its participation in international research and innovation networks.[1]

Science, research and innovation are intrinsically international activities. Sharing knowledge has always been essential to advances in science. Developments in the global economy, advances in information and communications technology, the emergence of global science projects, and a growing recognition of the role of science in addressing major global challenges are accelerating the pace and scale of international collaboration.[2] It is essential that Australia maintain its hard won place in global scientific endeavour. Successive Australian Governments have recognised the importance of international collaboration and engagement in building and maintaining Australia's science, research and innovation capabilities. Such engagement enhances our capacity for research excellence, which contributes to social, environmental and economic prosperity.

The Australian Government's ten year agenda – *Powering Ideas: an Innovation Agenda for the 21st Century* – recognises that the future is global. There is a renewed emphasis on networking and international collaboration to build capacity, facilitate access to new knowledge, attract foreign investment, and extend Australia's global influence. Indeed one of Australia's seven National Innovation Priorities is for Australian researchers and businesses to be involved in more international collaborations on research and development.

Benefits of supporting collaboration with other countries include: the development of strategic alliances; improved business, trade and diplomatic relationships; increased access to early development capital; increased access through third parties to European, North American and Asian markets, networks and infrastructure; knowledge sharing; and the ability to contribute to the global effort and address national challenges including energy, food security, the environment and water sustainability.

Collaboration also enhances the quality of our research, and our research sector, building capability and skills. This ultimately benefits society, through the many spill-over benefits of research and development that enhance the quality of our life, health, and the competitiveness of our country.

Though research is intrinsically an international pursuit, numerous drivers are increasing the 'internationalisation' of research, including advances in ICT, global challenges and 'big science'. Other countries, especially emerging research and economic leaders, are increasingly looking outward to engage globally and increase their research capability. In this environment, international research engagement is not just desirable, it is a driver of our competitiveness. Australia must make its research relationships a priority in order to continue to have a world-class innovation system that drives productivity.

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[1] Department of Innovation 2009, *Powering Ideas: An Innovation Agenda for the 21st Century*

[2] OECD Committee for Scientfic and Technological Policy *Fostering international science and technology co-operation to address global challenges,* working paper 2009.

1. Current portfolio support for international research collaborations

The Department of Innovation is responsible for managing intergovernmental research relationships across the innovation system. While other departments pursue bilateral and multilateral agreements in specific thematic areas for which they have portfolio responsibility, the Department of Innovation pursues international research engagement in a comprehensive way. This work facilitates Australian researchers in establishing productive partnerships with leading international researchers and institutions, thereby contributing to the Government's National Innovation and National Research Priorities.

The Australian Government has placed increasing importance on science and research. As part of *Powering Ideas* – the Australian Government's innovation agenda for the 21st century, it has identified international engagement as a key priority.

Powering Ideas is supported by a substantial $3.1 billion increase in funding over the next four years for science, research and innovation in Australia provided through the 2009-10 Budget. This lifts investment by almost 25 per cent compared with 2008-09 – from $6.9 billion to $8.6 billion.

The 2009-10 Budget also included measures that move to fund the full cost of research in universities, which will better enable universities to support increased international collaboration.

A substantial element of new spending supports research infrastructure, which contributes to Australian researchers' improved participation in leading edge international research. Specific international support included funding Australia's associate membership in the European Molecular Biology Laboratory (EMBL) and Australia's partnership in the Giant Magellan Telescope (GMT) located in Chile.

The Australian Government has also recently internationalised key research programs in an attempt to address some of the structural barriers to international collaboration. For example:

- Changes to the ARC's funding policies will support more extensive international collaboration in all ARC schemes;
- CSIRO's Flagship Collaboration Fund will enable international participation in large-scale multidisciplinary research partnerships; and
- Under new guidelines released in 2008 for the re-invigorated Cooperative Research Centres (CRC) Program, CRCs are encouraged to engage globally and co-investment with international organisations is particularly encouraged.

The Department of Innovation supports international collaboration through international elements of national research programs, as well as through programs dedicated to creating international research linkages.

Programs and activities targeted towards international research collaborations

The Department of Innovation fosters international research engagement in a strategic, targeted manner by:

- initiating and managing productive formal government to government relationships with key countries and international organisations;
- managing funding programs that provide the platform for supporting the activities that give substance to the commitments made under various science and technology treaties and MOUs;
- supporting high-level visits (ministerial, government-government, delegations of researchers) to and from a wide range of countries; and
- representing Australia's interests through a small number of dedicated science and technology staff at key overseas posts.

The portfolio administers the following government programs specifically aimed at facilitating Australia's global research connectedness.

International Science Linkages (ISL) Program

The ISL program supports the Government's commitment to its longstanding bilateral and multilateral international science relationships.

The program contributes to Australia's economic, social and environmental well-being by:

- facilitating Australia's access to the global science and technology (S&T) system; and
- enabling Australian scientists, from both the public and private sectors, to collaborate with international partners.

The ISL program enables the Australian Government to play a critical role in creating linkages between Australian researchers and research institutions and those in other countries. It also provides the means to support collaborative research in its early ('seed') stages, allowing researchers to develop their projects or networks to the extent that they may apply for further funding through a mainstream research funding program (such as through the ARC).

Funding of $94.5 million was awarded for the ISL Program over the nine financial years 2002-03 to 2010-11.

The ISL program includes five components:

- Strategic Policy: provides a vehicle for the Australian Government to establish, reinforce and leverage strategic links and relationships with key overseas counterparts.
- Australia-China Special Fund for S&T Cooperation: supports Australian participation in bilateral collaborative research projects which draw on the complementary strengths of researchers from Australia and China. There have been nine rounds held with an average of $1.25 million awarded per round.

- Australia-Europe Research Collaboration Fund: provides a vehicle for the Australian Government to establish, reinforce and leverage strategic research links and relationships with the European Union, and with European countries as appropriate.
- French-Australian Science and Technology Program: supports Australian participation in bilateral collaborative research projects which draw on the complementary strengths of researchers from Australia and France. There have been seven rounds held with up to $250,000 awarded per round.
- ISL – Science Academies Program: provides targeted support for specific activities using the networks and expertise of the Australian Academy of Science and the Australian Academy of Technological Sciences and Engineering.
- ISL - Humanities, Arts and Social Sciences (HASS) Academies Program**:** The program provides support for international research collaboration activities using the networks and expertise of the Australian Academy of the Humanities and the Academy of Social Sciences in Australia. This recognises the critical contribution of the HASS disciplines to the national innovation system

To date ISL has funded over 600 projects which have enabled 3,000 Australian researchers to collaborate with leading researchers in 40 countries on diverse topics of strategic importance. The focus of ISL supported activities at this stage of the program is on targeted, strategic activities that can be implemented by the scheduled end date in 2011.

Appendix B outlines current levels of support for international science and research collaborations through the ISL and Australia-India, Strategic Research Fund (AISRF) programs.

Australia-India Strategic Research Fund (AISRF) Program

The Australian Government is committed to bringing the relationship with India into the "front rank" of our diplomatic partnerships. Science is an area of comparative strength for India, and one in which it has enthusiastically embraced opportunities for international collaboration. The importance of science in the bilateral relationship was reflected in the strong focus on science during the Prime Minister's visit to India (11 – 13 November 2009) and the Prime Minister's announcement of a major boost to Australia – India scientific bilateral cooperation.

The most significant component of this announcement was an expansion of the Australia-India Strategic Research Fund (AISRF). This continues to represent Australia's largest bilateral research fund, with an Australian commitment now in the order of $65 million over eight years until 2014-15, matched by the government of India.

The main features of the expanded AISRF are:

- Additional incentives for 'end user' participation in the competitive grants component which supports 'bottom-up' investigator-initiated research;
- Introduction of a "grand challenge" fund supporting projects of larger scope and scale demonstrating both excellence in science and a clear path to end use for either commercial or public good in designated priority areas;

- Introduction of a significant fellowship program to support exchanges for Australian and Indian researchers.

Other elements of the Prime Minister's announcement included:

- building on a project originally supported through the Asia Pacific Partnership on Clean Development and Climate, Australia will provide an additional $1 million for a joint project between TERI and CSIRO on solar cooling and smart mini-grids. The project aims to develop and test a zero emissions 15kW solar cooling system for remote rural applications in un-electrified areas of India. The lack of proper cold storage facilities in India leads to the spoilage of an estimated 20m tonnes of fruit and vegetables annually, about one third of all agricultural produce. The project will include demonstration of an alternative desiccant cooling method, which produces potable water as a by-product.

- a substantial increase in the Australian Council for International Agricultural Research's budget for India, which will rise to $20 million over five years. ACIAR works with a range of agricultural research institutes in India in areas including dryland agriculture, wheat cultivation and water management.

To date the AISRF has supported more than 50 high-quality joint projects worth $20 million across a range of disciplines, including astronomy, biotechnology, agricultural research, nanotechnology and renewable energy.

International Postgraduate Research Scholarship (IPRS) Program

The Australian Government encourages talented international students to undertake their research training in Australia through such schemes as the IPRS scheme. 330 new IPRS places are supported each year at a cost of around $20m per annum. A number of Commonwealth and non-Commonwealth fellowship schemes are also available to attract talented researchers to Australia, provide career opportunities in Australia and support international mobility.

The Australian Government's research workforce strategy (announced in *Powering Ideas: An Innovation Agenda for the 21st Century*) will further examine the contribution of international connections to Australia's research workforce and Australia's needs in this area over the next decade. Work on the strategy is being anchored by the Department and will be completed in the second half of 2010.

Appendix C details the number of IPRS recipients by region and country of origin.

Other programs and activities with international elements

Cooperative Research Centres (CRC) Program

The CRC Program was established in 1990 as a demand-driven, collaborative, medium to long-term research program. The objective of the Program is to deliver significant economic, environmental and social benefits to Australia by supporting end-user driven research partnerships between publicly funded researchers and end-users to address clearly articulated, major challenges that require medium to long-term research efforts.

The Program was reviewed in 2008 as part of the broader Review of the National Innovation System. Following that review, a number of changes were made to the Program, including broadening it to reinstate public good research and encouraging participation from all industry and community sectors and all research disciplines, including humanities, arts and social sciences.

Collaborative research has been a cornerstone of the CRC Program from the outset. During the Financial Year 2008-09, 34 of the 48 CRCs across six broad sectors were involved in collaborative research projects ranging from deglacial ice core chemistry, eye-care, beef genetics, freshwater ecology and climate change and variability, through to greenhouse gas mitigation technologies. **Appendix D** lists the CRCs, their sector and the countries with whom they collaborate. The international parties involved in CRC collaborations include universities and other research organisations as well as businesses.

The six sectors are Agriculture and Rural-Based Manufacturing, Environment, Medical Science and Technology, Manufacturing Technology, Mining and Energy and Information and Communication Technology.

New R&D Tax Credit

The new R&D Tax Credit will come into effect from 1 July 2010. Eligible foreign companies will be able to access the tax incentive, providing increased opportunities for international collaboration in business R&D. It is recognised that more and more international firms are outsourcing their R&D activities to whichever location they believe is best equipped to support them. Thus the R&D Tax Credit aims to encourage multinational corporations to conduct their R&D activities in Australia.

Allowing overseas companies to access the tax incentive will increase Australia's national benefit by way of transfer of capital, new technologies and labour skills. It is also beneficial in terms of increasing the absorptive capacity of the Australian firms irrespective of the location of intellectual property (IP). There will be no restrictions on where the IP resulting from R&D activities conducted in Australia will reside. This is based on the principle that R&D activities in Australia will lead to spillover benefits, a rationale for public intervention in business R&D. In addition, the R&D Tax Credit will allow limited R&D activities conducted overseas (subject to certain criteria) and this is expected to enhance international business R&D collaborations.

National Measurement Institute (NMI)

NMI is Australia's peak body responsible for chemical, biological, physical and legal metrology (measurement science). NMI's role is to maintain and disseminate Australia's highest level measurement standards and associated expertise to national stakeholders

including government, the science and technology (S&T) community, industry and the general public. As the interface between the national and international measurement systems, NMI establishes and maintains international recognition of Australia's measurement standards through participation in internationally-coordinated scientific programs and collaborations with counterpart laboratories around the world. This ensures comparability and credibility of the national measurement system for Australian stakeholders operating in the global scientific, industrial and trade environment.

NMI is a strong contributor to – and, in some fields, a leader of – international scientific research in metrology to improve existing standards and develop next generation measurement standards. NMI undertakes collaborative research and networking activities with a wide range of international partners including counterpart national metrology institutes; universities; global and regional metrology bodies; and other expert bodies, such as the World Anti-Doping Agency (WADA) and the United Nations International Narcotics Control Board (INCB). NMI has established Memoranda of Understanding (MoUs) to provide a formal basis for R&D collaboration with counterpart laboratories in Germany, Japan, Korea, and New Zealand and is in the process of setting up an MoU with the national metrology institute of China.

NMI experts represent Australia at the peak global and regional expert measurement forums and, in a number of cases, play governance roles within these forums. They also proactively participate in numerous international scientific conferences **(**producing at least 20 peer reviewed scientific papers and issuing over 100 technical reports annually**)** and seek opportunities for staff to undertake scientific attachments at counterpart overseas laboratories in order to gain new scientific skills or develop specific research activities. NMI also hosts a number of international scientists, students and trainees for attachments of several months or longer on an annual basis.

Australian Space Research Program

The Australian Space Research Program (ASRP) was announced in the 2009-10 Budget as part of the Government's $48.6 million Australian Space Science Program. $40 million has been allocated to the ASRP over four years.

The objective of the ASRP is to develop Australia's niche space capabilities by supporting space-related research, innovation and skills in areas of national significance or excellence.

To achieve this objective, the ASRP provides two types of grants:

1. Space Education Development grants (Stream A) support student projects and educational activities, including international education opportunities and the establishment of national space education programs and centres of expertise for space education. International collaboration is encouraged.
2. Space Science and Innovation Projects grants (Stream B) support collaborative space research and innovation projects involving the development of Australia's niche space capability in areas of strategic national priority. International collaboration is encouraged.

International collaboration is encouraged under the ASRP as it has the potential to directly benefit Australia's space capabilities through companies and research institutions.

International collaboration could see ASRP projects tested in world class facilities, placed into orbit, or integrated into existing high level projects.

Australian Institute of Marine Science (AIMS)

> Our oceans do not function in isolation and so the results of our research have relevance to the globe .. (W)e must consider science conducted elsewhere for its potential relevance and utility for our waters. International collaboration is one of the mechanisms by which we ensure our science remains globally relevant, of high quality and internationally competitive. – *AIMS 2009*

As Australia's leading tropical marine research agency, AIMS collaborates extensively internationally as a means of expanding its science capabilities and capacity. AIMS collaborates with 89 organisations from 15 countries. In 2008, more than 30% of AIMS publications were written with an international co-author. AIMS' collaborations enable them to expand their expertise, apply scientific problems and access techniques and technologies not available within Australia. Collaboration is a key mechanism by which they benchmark their science and inject additional innovation to the problems at hand.

Beyond research projects, AIMS is also involved in significant outreach and networking activities, noting that these are critical to the quality and relevance of their science program, as well as providing a mechanism for knowledge diffusion. This involves presentations, planning meetings and other workshops involving AIMS scientists regularly occur in USA, Europe and Asia-Pacific nations. Several recent examples include the 12th International Society for Microbial Ecology Congress and the 8th Indo-Pacific Fish Conference.

Intellectual Property Australia (IP Australia)

As a prescribed agency within the Innovation, Industry, Science and Research Portfolio, IP Australia is responsible for administering Australia's intellectual property (IP) rights system, specifically trade marks, inventions (patents), designs and plant breeders' rights.

IP Australia also promotes awareness of intellectual property, provides advice to government on the development of IP policy, and contributes to bilateral and multilateral negotiations to support the global IP system for the benefit of the Australian economy and society.

IP Australia is involved in collaborative work on IP provisions that affect international research engagement. This includes looking at provisions that will improve use and flow of patented knowledge among scientists and researchers.

Departmental Engagement with OECD Research Projects

The Department of Innovation is actively engaged with the Organisation for Economic Cooperation and Development's Science, Technology and Industry Directorate, and contributes to relevant research projects in science, research and innovation.

Examples of research topics include: the globalisation of R&D; governance of multilateral research projects to address global challenges; the measurement of innovation; nanotechnology in the business environment; nanotechnology monitoring and benchmarking; scientific research collections; and built environments.

Square Kilometre Array

The Square Kilometre Array (SKA) is one of the largest and most ambitious international science projects ever devised. The SKA will be a new generation radio telescope with a discovery potential 10,000 times greater than the best present-day instruments. It will give astronomers remarkable insights into the formation of the early universe, including the emergence of the first stars, galaxies and other structures. As a result, the SKA will require new technology and progress in fields such as information and communication technology, high performance computing and production manufacturing techniques. The anticipated capital cost of constructing the SKA is around $3 billion, with an annual operating budget over its 50-year plus lifetime of around $200 million a year.

As an initial step, the Australian Government, New Zealand Government, the State of Western Australia and the CSIRO, are working together to establish a potential core site in Western Australia. Two sites are currently under consideration by the international community; the other potential site being in South Africa. Work is well underway on building the Australian SKA Pathfinder (ASKAP), which will provide an important test bed for SKA technology as well as being a world-leading telescope in its own right. The Australian Government has committed funding of $111 million to the ASKAP, which will comprise up to 36 12-metre antennas, each with a multi-element receiver, to enable unprecedented surveys of the sky.

The SKA will have a profound impact on radio astronomy around the word, which in turn will have a significant impact on other related technologies such as data storage and retrieval. Internationally the SKA program is being progressed by a consortium of institutions from 19 countries, including Australia/New Zealand and countries in Europe, Asia, Africa and the Americas.

Significant international engagement will be crucial for the success of the SKA, as each country contributes its respective expertise and research strength to the project. Australia is already working with China to construct the ASKAP antennas, and CSIRO is working in conjunction with colleagues in the Netherlands, Canada, United Kingdom and Germany to develop the 'phased array feeds' necessary for the ASKAP to operate.

At a diplomatic level Australia has actively sought the support of many countries in preparing the joint bid to host the SKA. International agreements in particular have had a vital role to play in facilitating cooperation with global partners. In particular, Australia has signed a formal Memorandum of Understanding with both Italy and New Zealand.

In addition, Australia and South Africa have agreed to collaborate in the development of a coordinated scientific and technical program for the SKA pathfinder telescopes, the South African Karoo Array Telescope pathfinder and the Australian SKA Pathfinder (ASKAP). The collaboration will enhance the scientific impact of both pathfinders and contribute to advancing the international SKA program overall.

2. Benefits of international research collaboration

> [T]o achieve the sort of global and regional outcomes that are consistent with our interests, we cannot simply rely on our national assets but instead must act in partnership with our allies, friends and the broader international community.[3] ~ *Prime Minister Kevin Rudd*

Australia has strong research and higher education sectors, and produces high quality research according to recognised research indicators[4]. However, working together allows us to achieve much more than we could on our own. The benefits of international research collaboration accrue to all countries involved, and more broadly, to society as the ultimate benefactors of the products of research. This is because international collaboration can increase the quality of research,[5] by pooling knowledge and resources, and achieving research outcomes that may not otherwise be possible. Broader benefits to society accrue due to effects such as the positive benefits on diplomatic relationships, and the value for money achieved through spreading cost and risk.

From a market perspective, effective international collaboration and engagement can provide access to leading knowledge developments and scientific facilities worldwide and provide a conduit through which business can build their knowledge of and absorptive capacity for leading edge technological developments. It can also open up opportunities to market innovative products as well as research expertise. Put simply, for a small market – 0.3 per cent of the world's population – with a small research base – 3 per cent of the world's research – accessing the research base beyond our borders is critical for our innovation capacity.

Enabling Australia to address global challenges

Challenges such as climate change, food security, water scarcity and pandemics are global problems, with solutions that will largely depend on science and research. At the G8 +7 Science and Technology Ministerial meeting, Ministers from G8 and many non G8 countries re-emphasised the important role that science and technology have to play in understanding the global challenges, and in developing appropriate solutions. Participation in major research projects that address such challenges enables us to contribute to and access relevant knowledge, as well as assisting in the efforts to analyse global data.

Examples from Government supported programs which provide this benefit: *The Global Carbon Capture and Storage Institute; Integrated Marine Observing System (and its relationship to global systems);* and *the grand challenges component of the Australia India Strategic Research Fund.*

Knowledge transfer

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[3] K Rudd, Prime Minister of Australia, 26 March 2008, *Advancing Australia's Global and Regional Economic Interests,* Address to the Address to the East Asia Forum in conjunction with the Australian National University.

[4] Thomsen ISI citation impact is one indicator of research quality.

[5] Internationally collaborative research is more highly cited than research without international co-authorship. See M Matthews et al , *A Bibliometric Analysis of Australia's International Research Collaboration in Science, Engineering and Technology: Analytical Methods and Initial Findings*. Forum for European-Australian Science and Technology cooperation discussion paper <http://www.feast.org/index/document/1>.

This occurs in a variety of ways at a number of levels. Researchers exchange tacit and codified knowledge through attendance at international conferences, participation in collaborative research projects and other forms of international mobility such as short-term exchange programs.

Networking, collaborative work and mobility result in the exchange of skills and training, as well as access to the latest development in knowledge, including new instrumentation and technical advances.

Access to international networks and resources enable our domestic researchers to access the latest developments in knowledge, including new instrumentation and technical advances, and remain at the cutting edge of their discipline/research area. This creates the capacity to absorb knowledge and ideas that can be subsequently transferred to other researchers and/or research end users in Australia.

In this manner, knowledge flows to researchers in business and industry, through direct international engagement (where they have research and development capacity) and engagement with Australian public institutions that have connections to the global research base (this access point is especially true for smaller firms). Australian business may also access knowledge through participating in export markets and global supply chains or hosting R&D investment by multinational enterprises.

Examples from Government supported programs: *93 conferences, workshops, symposia and fora that have been supported under the ISL Program totalling $4.1 million over 8 years to June 2009 – e.g. the World Hydrogen Energy Conference 2008; Australia's participation in the Global Biodiversity Information Facility (GBIF);* and *Australia's associate membership of the European Molecular Biology Laboratory (EMBL)*

Enhancing the quality of Australia's research outputs.
Research is by its nature international. However, there is some evidence that international engagement increases the quality of research, particularly on measures such as citations[6].

There is also some evidence that academic researchers with overseas experience are likely to produce higher quality output. In particular, recent OECD analysis suggests Australia's most highly cited researchers have benefited from research experience outside of Australia i.e. mobility has been a factor in improving research outcomes.[7]

Access to the latest knowledge, instruments, technology and infrastructure can increase the capacity of researchers to advance in their fields. In the same manner, access to and integration of international datasets can give researchers essential information, or the ability to approach problems on a global basis (for example by sharing worldwide data through the Global Ocean Observation System, which links with Australia's Integrated Marine Observing System).

Skills development and recruitment

[6] M Matthews et al , *A Bibliometric Analysis of Australia's International Research Collaboration in Science, Engineering and Technology: Analytical Methods and Initial Findings*. Forum for European-Australian Science and Technology cooperation discussion paper <http://www.feast.org/index/document/1>.
[7] OECD, *The Global Competition for Talent*, Paris 2009

International collaboration with the world's research and innovation leaders helps to meet Australia's ongoing need for skilled people by enhancing the skills of Australian researchers. A number of studies[8] have highlighted the important role of migration and international mobility to sustaining Australia's academic workforce and providing Australian researchers with the experiences required to advance their skills and ultimately maximise their contribution to Australia's research efforts.

In business, international engagement provides opportunities to recruit overseas specialists, as well as on-going links into the innovation systems and business community of those countries. A recent study[9] estimates that around 20 per cent of Australia's doctorate by research qualified individuals is from international sources.

Examples from Government supported programs: *Emerging Research Leaders Exchange Programs supported through ISL, which support the exchange of early-career researchers and facilitates life-long linkages; Australia's associate membership of EMBL;* and *the Australian Academy of Science's International Scientific Collaborations Program, which supports exchanges of researchers at all stages of their careers.*

Achieving scale (critical mass, sharing risk, accessing infrastructure)
Advances in technology, ICT and knowledge have led to research projects becoming bigger than ever before. Not only do the questions that are being asked often require more data, technology and knowledge to address; research infrastructure is larger and more expensive than ever before[10].

International engagement spreads risk in an inherently risky enterprise, as many of the benefits of basic R&D accrue to society as 'spill-overs' rather than to the researcher or institution[11].

Collaborating with other countries also allows participation or buy-in to projects that Australia could not reasonably fund on its own , for example, the Large Hadron Collider.

By collaborating internationally, researchers have a greater pool of knowledge and specialisation from which to build critical mass in any given field of research.

Examples in Government supported programs: *the Square Kilometre Array; the Large Hadron Collider; Treaty with the European Organisation for Nuclear Research (CERN);* and *Australia's partnership in the Gemini Observatory.*

[8]For example G Hugo *The demographic outlook for Australian universities' academic staff* Council for the Humanities, Arts and Social Sciences Occasional Paper 2008; F Wood (editor) *Beyond Brain Drain – Mobility, Competitiveness and Scientific Excellence* Workshop Report, University of New England, Armidale 2004

[9] Australian Council for Educational Research, *Supply, demand and characteristics of the higher degree population in Australia*, Submission to Department of Innovation, 2009

[10] For example, the anticipated capital cost of constructing the SKA is around $3 billion, with an annual operating budget over its 50-year plus lifetime of around $200 million a year.

[11] Productivity Commission *Public Support for Science and Innovation*, Research Report, Canberra 2007.

Leveraging co-investment in innovation, research and development
Raising international awareness of the quality of Australian innovation, science and research engagement with the global community helps leverage funding for collaborative research.

Examples in Government supported programs: *Joint investment in bilateral and multilateral projects through the €50 billion*[12] *EU Framework Programme for research;* and *Joint investment in bilateral research projects such as through the Australia-China Special Fund.*[13]

Maintenance of strong bilateral relations, global influence and capacity building
International recognition as an advanced and innovative nation assists Australia to strengthen relations with other nations and extend its global influence, as well as strengthening Australia's place in the southern hemisphere and the region as one of the leading knowledge nations. Research collaboration is an essential component of many of Australia's broader bilateral relationships.

In addition, research collaboration helps Australia transfer expertise to aid recipients and thus facilitates aid delivery through capacity building. It also provides a means to benchmark Australian work against world-best practice through partnerships with leading centres.

Examples: Objective five of the *EU Partnership Framework (S&T Co-operation);* and *science and technology co-operation is a key component of our bilateral relationship with India.*

[12] More than €50 billion over seven years from 2007-13
[13] An internal Departmental review showed that competitive grants money from the Australia-China Special fund leveraged A$25 million from other funding sources (by the responding researchers), from less than A$8 million contributed by the Australian Government.

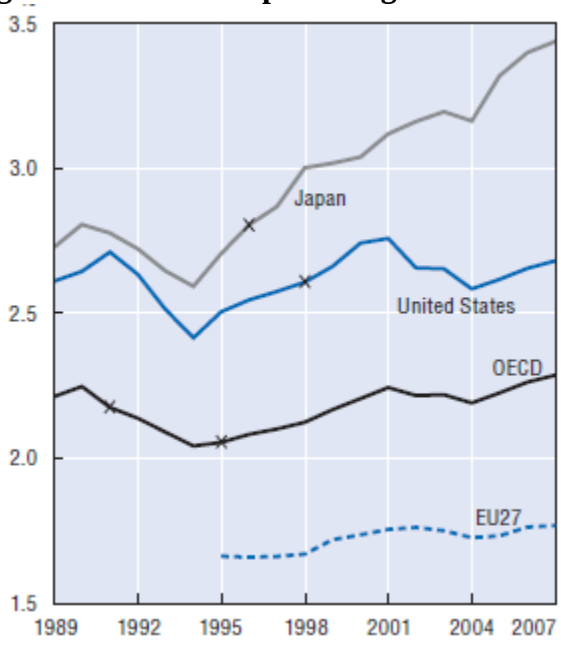
3. Key policy drivers for international research collaboration

The increasing globalisation of R&D has accelerated the trend towards greater international collaboration and broadened the set of policy drivers. International research collaboration has traditionally been valued for its contribution to building and maintaining scientific excellence by attracting and retaining talent, combining complementary expertise, and gaining access to major leading-edge research facilities. However, in the context of unprecedented worldwide investment in research, the emergence of new science leaders, and the rise of multidisciplinary global challenges, the drive to engage effectively with international partners has never been more critical.

Growing investment in research worldwide

Major economies around the globe are recognising that strategic investment in education, science and research enhance their economic, social and environmental wellbeing. There is a growing recognition of the need to transition to a knowledge-based economy to ensure jobs and global competiveness. As a consequence, industrialised economies are spending more than ever on R&D. The annual growth rate in real R&D expenditure has been 4.7 per cent in the ten years between 1995 and 2006, much greater than the average GDP growth of 2.5 per cent.

Figure 1: GERD as a percentage of GDP 1989 - 2007[14]



Led by China and India, non-OECD countries are rapidly changing the global research environment by increasing their share of global R&D from 11.7 per cent to 18.4 per cent over ten years (to 2005).[15] To put this in perspective, China's investment in R&D (GERD) increased to $86.8 billion in 2006, 7.5 times higher than ten years before.
As the world expands its science and research capacity the need for Australia to look outwards to its relationships with future leaders becomes even more critical. While emerging nations grow their share of R&D, Australia's portion of the world's R&D will

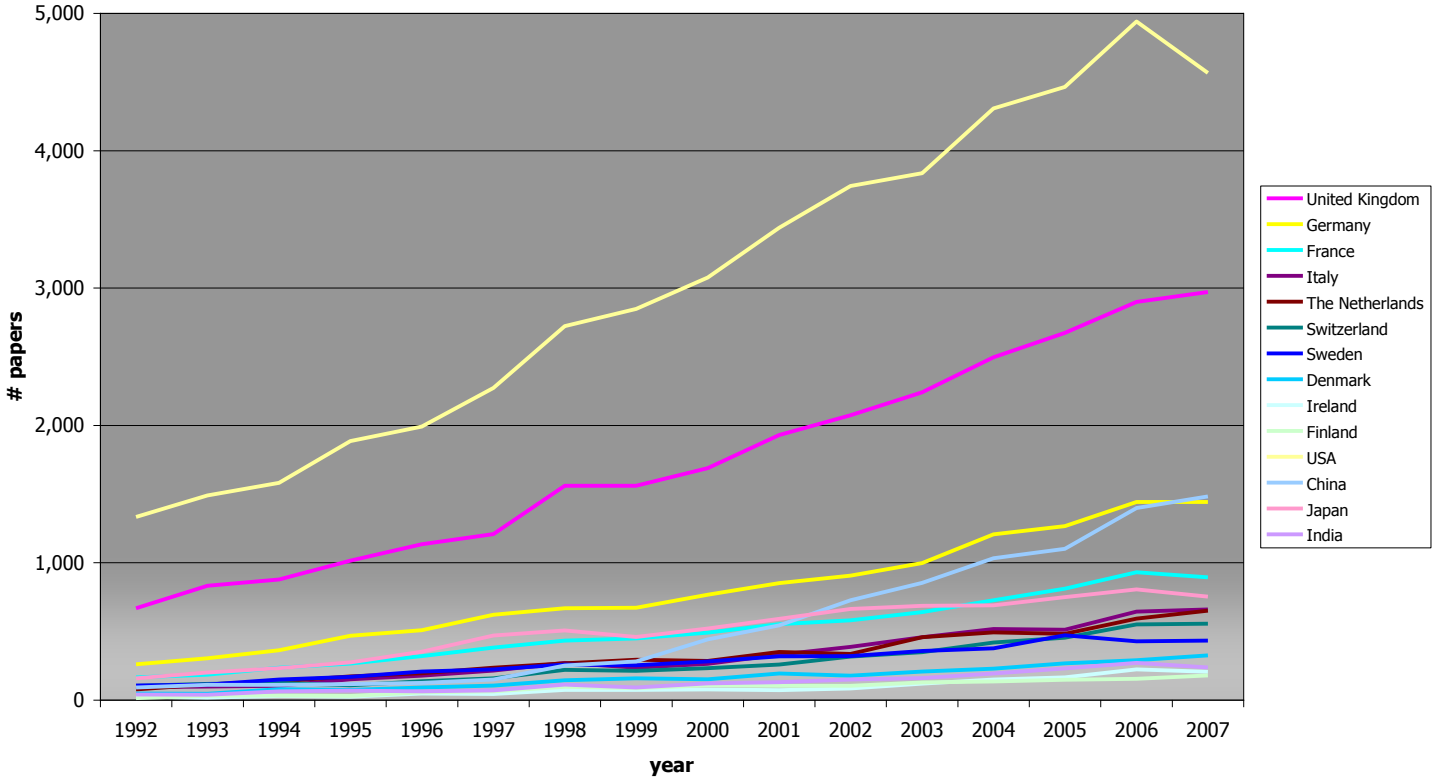
[14] OECD, *Main Science and Technology Indicators, 2009/1*, Paris 2009
[15] OECD, *Science, Technology and Industry Outlook* Paris 2008.

necessarily shrink, leaving us with the risk of being marginalised by the sheer size of new economic superpowers.

Internationalisation of research

Simultaneously, international research collaboration is growing in many countries including Australia. In 2007, 43 per cent of all papers with an Australian author included an international co-author, an increase from 39 per cent in 2003.[16] US researchers are consistently the largest collaborators on internationally co-authored papers with an Australian author, reaching 4,565 in 2007. This is followed by UK researchers with 2,700 and then German and Chinese researchers with 1,443 and 1,482 co-authored papers with Australian authors respectively.

Figure 2: number of internationally co-authored papers with an Australian author 1992-2007



Source: FEAST from Thomson Reuters Web of Science data

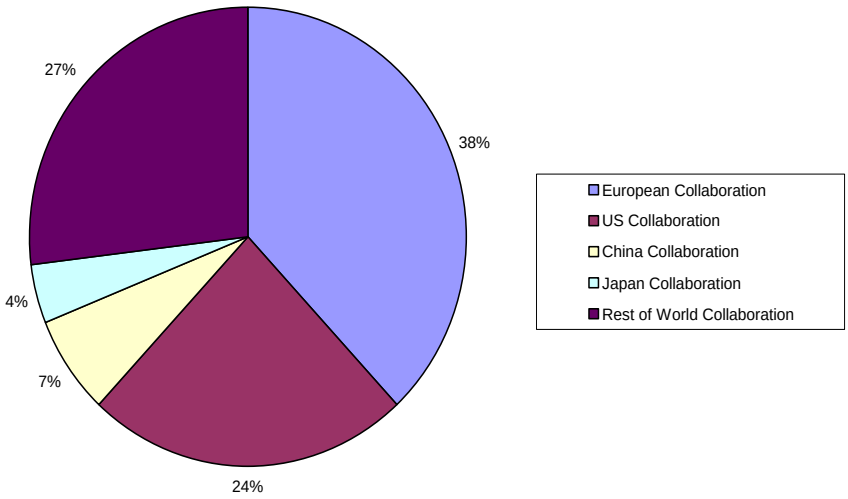
However, when Australian research co-authorship with the UK, Germany, Netherlands and other European countries are added together, Australian co-authorship with European researchers exceeded that with the US in 2007. Collaborations with Europe have been supported and enhanced by strong bilateral linkages with the UK, Germany, France, Italy and the Netherlands.

Consistent with this trend of internationalisation, high-performing OECD and non-OECD countries have adopted international research engagement strategies (with attached funding) to ensure their investment in research is well integrated into global research

[16] Thomson Reuters Web of Science

networks and knowledge. Examples of this include Germany's *Strategy of the Federal Government for internationalisation of science and research 2008;* China's *National Strategy and Plan for Science and Technology Development (2006 – 2020)*; and *Internationalisation of Finnish Science and Technology 2004.* Consistent with such outreach strategies, other countries frequently approach the Australian Government to increase our Government-supported bilateral engagement, often pledging significant matched funding.

Figure 3: Percentage of Internationally Co-authored Australian Papers with Selected Countries (2007)



Source: Thomson Reuters Web of Science

It is important to note that research collaboration is not limited to public sector research but also involves private sector firms. In fact, according to UNCTAD[17] 700 firms with the largest expenditure on R&D are responsible for almost half the world's total R&D expenditure and over two thirds of business R&D. This figure is dominated by multi-national enterprises (MNE), with more than 95% of the firms identified being MNEs. This research is increasingly global, with competition and rising R&D costs leading to increasing globalisation of business R&D, with many multinational firms undertaking R&D away from headquarters.

By contrast the Australian economy and R&D effort is characterised by a relatively large number of small firms. We have relatively few MNEs in the manufacturing sector, although there are many MNEs in banking, telecommunications and mining for which Australia represents an R&D base. In total we have a relatively low level of business expenditure on R&D – at 1.2 % of GDP we rank 12th in the OECD. On the other hand our business R&D has been growing strongly – at just under 20 % pa over the last five years.

[17] United Nations Conference on Trade and Development, *World Investment Report. Transnational Corporations and the Internationalization of R&D*, New York and Geneva, 2005.

For Australia to maintain its strong Business Expenditure on R&D (BERD) growth over time we will need to take advantage of the possibilities that more open and global innovation systems create through participating in the global R&D decisions of MNEs and ensuring that our smaller R&D players are able to access the global knowledge base from Australia.

Rise of global challenges

The growing scientific and political recognition of the urgency of addressing major global challenges such as climate change, food and water shortages, security, and global health issues are forcing governments to accept the need to pursue an agenda in which science and research are central. Solutions to these problems necessarily require a multidisciplinary, collaborative approach. For example, senior management of the Antarctic & Climate Ecosystems CRC recently noted the importance of multidisciplinary collaboration, particularly in areas that naturally cross national boundaries, such as climate science and Antarctic research. Similarly, international research collaboration in the space field is partly driven by the need to participate in international bodies that tackle truly global capabilities and problems, such as the Group on Earth Observations.

Improving national competitiveness

With respect to globalisation of R&D and innovation, important policy objectives driving an increased focus on international engagement are: improving ability of national firms to compete globally through R&D and innovation; creating skilled jobs in order to retain and attract talent; linking local SMEs to global networks and provide them with market opportunities; accessing technology developed abroad for national benefit; and attracting foreign investment for R&D and innovation.

4. Impediments and opportunities

Barriers to international collaboration can broadly be categorised under the following headings:

Financial
Access to dedicated funding for international collaboration can promote opportunities to expand research engagement, particularly where there is a requirement for co-investment. Australia's distance from well established centres of science and research means that relatively higher costs are involved when Australian scientists and their organisations initiate symposia and workshops to bring together international collaborators and develop research in international programs, including the international use of expensive facilities and logistics. Dedicated support for exchange programs, travel costs, workshops and networking activities are vital to our overall international engagement strategy. On the industry R&D side, appropriate financial incentives, including a favourable R&D tax regime, facilitate international engagement.

Geographical
Difficulties created by the distance and time differences between partners can be impediments to engagement. Research suggests that proximity of the partners matters for effective collaboration, as regular face to face contact is necessary to establish effective working relationships. For example, initial results obtained from the Departmental project on the Globalisation of Innovation (which involved the interviewing of a number of multinational enterprises) suggest that distance from the shareholder base and large R&D laboratories in other countries can present a barrier. To some extent this can be overcome by communications mechanisms such as email and videoconferencing but they complement rather than replace face to face contact. In the research sector, even small amounts of travel funding can play an important role in catalysing and cementing collaborative partnerships, particularly in the early stages.

Regulatory
These include constraints created by legislation or regulatory rules relating to research conduct or funding. Immigration rules restricting fast entry of overseas people, or a lack of effective Intellectual Property (IP) management regimes can become boundaries to international co-operation, limiting the ability of people to travel, or increasing risk associated with joint ventures. More information about IP regulation as it relates to research engagement is at **Appendix D**.

Regulatory rules relating to areas of research conduct can create an impediment or an opportunity for research collaboration and overseas investment depending on how they are framed. For example a fundamental area of pharmaceutical research is the conduct of clinical trials. The regulatory environment for Australia's clinical trials is complex and Australia has traditionally been a strong performer in this area. In 2009 the Action Group for Clinical Trials was created and tasked with proposing reforms, including to Australia's clinical trial regulatory regime. This is occurring in the context of a competitive environment where overseas counterparts are trying to streamline drug approval timeliness. Reforms arising from this process will affect the attractiveness of research collaboration and overseas investment, increasing research collaboration.

Rules relating to research funding can become barriers to international research collaboration by prescribing how funds are to be used and the relationships with other bodies involved in the project. Similarly, previous reports have identified a lack of synchronisation of Australian and international funding cycles as a significant barrier, for example, in the case of Australian participation in the EU Framework Programmes.[18]

Visa regulations can affect the ability of researchers to move between countries, and either encourage or discourage the circulation of researchers (including PhD students) between countries. For example the EU has attempted to establish attractive conditions for non-EU workers to take up highly qualified employment in member states of the EU, by creating a fast-track procedure for issuing special residence and work permit[19].

Cultural

The culture and values of international partners can create barriers as collaboration may not be supported by the management of a particular organisation or adequately resourced. Communication issues can also create impediments to international collaboration, particularly where there has not been extensive previous contact.

Communication

Awareness of how to navigate funding and governance structures can affect a researcher's ability to access networks and funding. For example, the European Union has established National Contact Points (NCPs) in different countries to assist in accessing the European Framework Programs, which are a major source of research funding for the European Union. In Australia, the Forum for European-Australian Science and Technology Cooperation (FEAST) is the NCP.

[18] Prime Minister's Science, Engineering and Innovation Council, *Australia's Science and Technology Priorities for Global Engagement*, a report of the PMSEIC working group, 2006.
[19] See http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressdata/en/misc/107989.pdf

5. Principles for supporting international research engagement

This section focuses on the rationale for Government support for international research engagement: while good links at the researcher level are a necessary for successful international engagement, individual *ad hoc* collaborations can not substitute for strategic support at the institutional and governmental levels.

For example, relying solely on individual research collaboration can inhibit the development of relationships with countries where research funding is more closely controlled by government priorities. In these cases, an effective government-to-government dialogue is crucial to identifying future priorities and actions. Such dialogue is only of maximum value if coupled with access to targeted funding which can put recommended actions into practice. A modest but dedicated funding source for strategic international collaboration initiatives allows Australia to be responsive to emerging opportunities.

In addition, the Government is in a position to establish and maintain appropriate diplomatic mechanisms to facilitate international research collaboration. Currently, the Department manages 30 science and technology agreements, of which 10 are active and involve strategically important countries, and four have established bilateral science and technology reciprocal funds including with India ($50 million over five years from 2010-11), China, France and Japan. These agreements are implemented through accompanying bilateral joint committee meetings which identify priorities, agree on which projects will be recommended for funding and discuss the broad strategic direction of the science and technology relationship.

On this basis, the Government supports international research engagement according to the following principles:

Government involvement is required to facilitate collaboration

The rationale for Australian Government support for international research engagement with any country is based on the extent to which government involvement will enhance research opportunities, and deliver research outcomes which would not otherwise be achieved – in short, where there is a 'market failure'.

A good example of this is the Australia Government's support for researcher engagement with China. China's political structure is sufficiently different from Australia's that ongoing government-to-government liaison is required to progress collaborations.

There are instances where buy-in, or formal agreements at a national level are required before international partners are able to collaborate. Brazil and Vietnam require treaty level agreements before releasing government funds to their own researchers for international collaboration. The EU-Framework Programme for research requires a financial contribution from all project collaborators.

Government involvement can also be required to create critical mass in a particular field – for example, the Square Kilometre Array will bring together people, funding,

infrastructure and knowledge from numerous countries to create critical mass in the field of radio-astronomy.

Countries are chosen based on assessment of the likely benefits of collaboration
The choice of countries with which Australia manages an active science and research relationship is based on:

- the anticipated scientific, economic and social benefits from science and research cooperation with the other country (including consideration of the timeframe within which these benefits can be expected);
- the extent to which a formal science and research arrangement will deliver benefits to Australia which would not otherwise be realised;
- broader strategic, whole-of-government considerations.

Recognition of potential mutual benefits from science and research collaboration is based on identifying which countries:

- provide a consistent, significant investment in research and development (known as Gross Expenditure in Research and Development, GERD); and/or
- achieve above world average impact in particular science fields in scientific publications (as measured by ISI citations); and/or
- are leaders in niche areas of science.

Research areas align with national priorities and global focus
Research areas chosen for Government support are chosen on the basis of alignment of mutual interest and strength, as well as those that align with Australia's National Research and Innovation Priorities. These are often determined through a process of bilateral Government-Government consultations that include stakeholder and expert representation.

More recently, research effort has been directed towards solving the "grand challenges" of our time such as climate change, global health issues and food security. Already, a new 'Grand Challenge' component has been introduced as part of the expanded Australia-India Strategic Research Fund, which will fund projects of larger scope and scale designed to deliver tangible outcomes in areas such as food security, water and climate change.

Modes of engagement are chosen based on what is most suitable and effective
Common modes include:

- supporting researcher (particularly early career) exchange programs; and
- providing access to major international infrastructure or networks.
- facilitating networking through supporting travel, workshops and conferences;
- directly supporting research projects through support for travel in networked projects or other support for research activities.

At a Government to Government level:

- initiating and managing formal government to government relationships with key countries and international organisations;
- developing high-level visits to and from a wide range of countries; and
- maintaining dedicated science and technology staff at key overseas posts.

Modes of engagement are chosen based on negotiations with the bilateral (or multilateral) partners, and based on what will create the most effective use of funds. Some Governments have a strong preference for a particular kind of Government engagement (for example supporting a bilateral grants program), which often means that this is the most effective means of supporting collaboration.

6. Conclusion

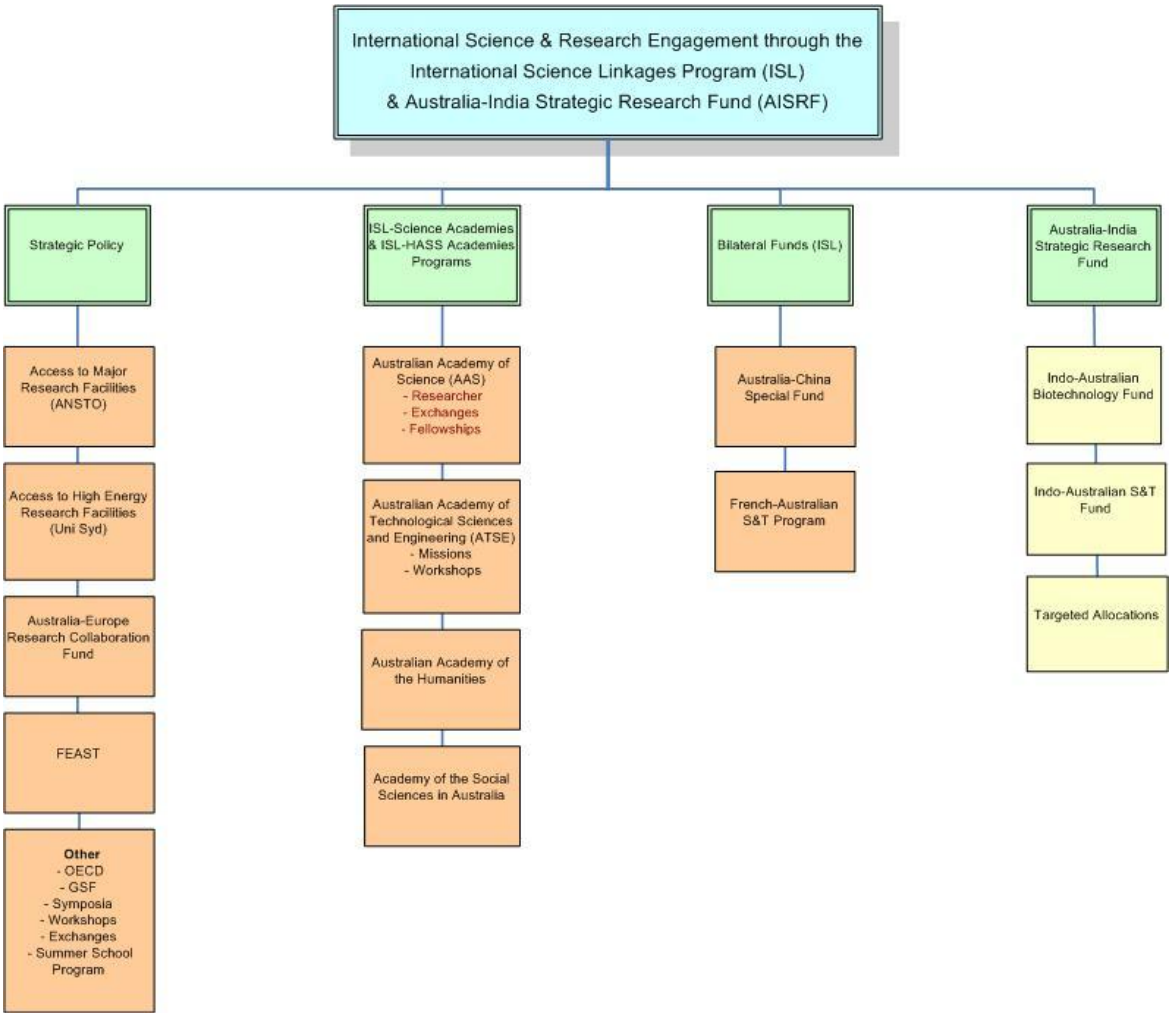
Countries worldwide recognise the importance of international science and research engagement to national prosperity. The ever-increasing complexity and cost of scientific discovery and technological development; the acceleration of globalised commerce, trade, finance and information flows; as well as the rise of global challenges mean that participation in global science and technology is essential to the maintenance of living standards and a nation's global competitiveness.

Australia, like most countries, is a net importer of technology and, in global terms, produces only a small proportion of new knowledge. Therefore it is critical that Australian researchers collaborate extensively internationally to contribute to new knowledge and major international research efforts, and remain at the cutting edge of science and research, new technologies and opportunities for innovation. The Australian Government has an important role to play in facilitating this engagement for the benefit of all Australians.

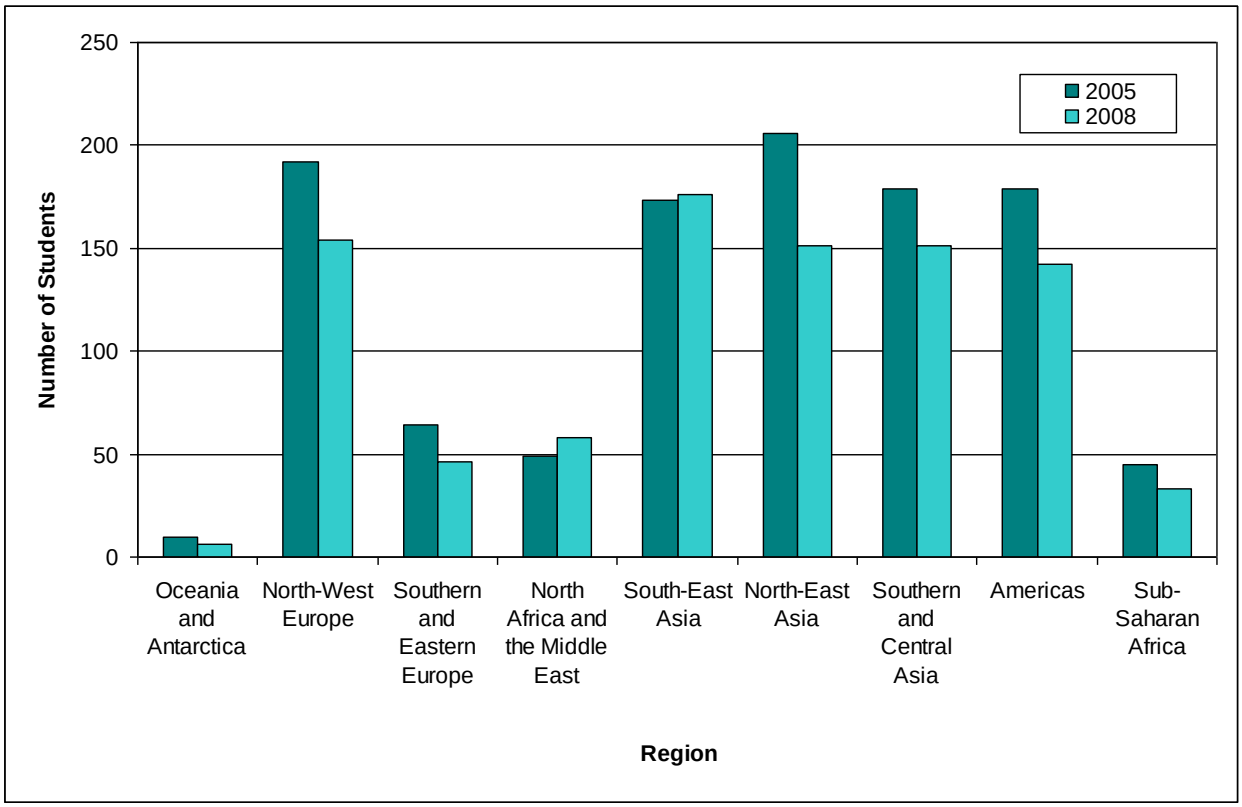
APPENDICES

Appendix A – Current support for international research engagement through:

- **International Science Linkages (ISL) Program**
- **Australia-India Strategic Research Fund (AISRF)**



Appendix B – International Postgraduate Research Scholarships (IPRS) program: recipients by region and country of origin for years 2005 (AUD$18.1 million) and 2008 (AUD $19.2 million)



Location of Permanent Residence	IPRS Awarded	
	2005	2008
Argentina	7	5
Armenia	1	1
Austria	9	9
Bangladesh	45	49
Belarus	2	2
Belgium	5	5
Bhutan	0	1
Botswana	1	1
Brazil	12	21
Brunei Darussalam	1	0
Burma (Myanmar)	0	2
Cambodia	1	1
Cameroon	1	1
Canada	52	38
Chile	8	7
China (excludes SARs and Taiwan Province)	151	114
Colombia	10	6
Congo, Democratic Republic of	1	1

Location of Permanent Residence	IPRS Awarded	
	2005	2008
Croatia	2	2
Czech Republic	2	0
Denmark	6	5
Ecuador	3	1
Egypt	6	5
Ethiopia	4	3
Fiji	4	1
Finland	1	1
Former Yugoslav Republic of Macedonia (FYROM)	3	2
France	10	7
French Polynesia	1	1
Gambia	1	0
Georgia	0	1
Germany	84	73
Ghana	3	1
Guatemala	1	0
Hong Kong (SAR of China)	12	9
Hungary	6	2
India	78	59
Indonesia	18	25
Iran	23	36
Israel	10	8
Italy	21	18
Japan	15	9
Jordan	2	5
Kenya	5	7
Korea, Republic of, South	10	5
Kyrgyz Republic	3	0
Lesotho	1	0
Libya	1	0
Laos	0	1
Lebanon	0	2
Macau (SAR of China)	2	1
Malawi	2	0
Malaysia	40	39
Malta	1	0
Mauritius	2	3
Mexico	12	7
Moldova	0	1
Morocco	1	0
Nepal	8	8
Netherlands	11	7
Nigeria	5	4
Norway	6	5
Pakistan	14	11
Palau	0	1
Papua New Guinea	3	2
Peru	0	3

Location of Permanent Residence	IPRS Awarded	
	2005	2008
Philippines	7	15
Poland	6	4
Romania	5	6
Russian Federation	8	4
Serbia	6	1
Singapore	44	48
Slovenia	1	0
Solomon Islands	1	0
South Africa	7	5
Spain	0	1
Sri Lanka	28	19
Sweden	7	4
Switzerland	7	9
Taiwan	16	13
Tanzania	0	1
Thailand	22	14
Tonga	1	1
Trinidad and Tobago	0	1
Turkey	5	2
Uganda	0	1
Ukraine	2	2
United Arab Emirates	1	0
United Kingdom	46	29
United States of America	71	52
Uzbekistan	2	2
Venezuela	3	1
Viet Nam	40	31
Zambia	1	0
Zimbabwe	5	4
Unknown	6	2
Total	1098	917

Appendix C – Current International Collaborations, CRC Program

CRC and Sector	Country
Manufacturing Technology	
CRC for Construction Innovation	US , Canada
CRC for Advanced Composite Structures	France, Germany, Spain , UK , Italy, Germany , US , New Zealand, Canada , Japan, Singapore
CAST Cooperative Research Centre	Austria, Belgium, Canada, China, France, Germany, Japan, Norway, South-Africa, Sweden, UK, US
CRC for Rail Innovation	Canada, France, UK, Singapore, Sweden, US, Netherlands
Medical Science & Technology	
CRC for Aboriginal Health	Canada, PNG, Samoa
The Vision Cooperative Research Centre	Cambodia , Fiji **,** US **,** Japan **,** UK **,** Finland**,** Swaziland **,** China **,** PNG**,** Sri Lanka **,** Mongolia **,** Switzerland
CRC for Cancer Therapeutics	Canada, UK , US
The Hearing CRC	Germany, Hong Kong , Canada, US , NZ, UK
CRC for Oral Health Science	Japan , Singapore , US , Chile, Vietnam , UK , Thailand , Japan, Peru , Canada
Environment	
Desert Knowledge CRC	US , South Africa
CRC for Sustainable Tourism	Singapore, Korea Republic , Thailand, NZ , UK , Spain , Macau , Turkey , Brazil, Canada , Denmark , US , Mexico, South Africa , Sweden, Finland , South Africa, Netherlands
CRC for Antarctic Climate & Ecosystems	Argentina , Belgium, Bermuda , Canada , China , Finland , France , Germany , Italy, Japan , NZ , Netherlands , Norway, Spain, UK , US
CRC for Irrigation Futures	South Africa
eWater CRC	Korea Republic
Invasive Animals CRC	NZ, US, UK, Italy, France, Israel, NZ
CRC for Contamination Assessment and Remediation of the Environment	Germany, US, UK, China, India, NZ

Agriculture & Rural-Based Manufacturing	
Molecular Plant Breeding CRC	China, South Africa, US , Japan, Uruguay, NZ, UK, Germany
CRC for the Australian Poultry Industries	Norway
CRC for Sugar Industry Innovation through Biotechnology	US
Australian Biosecurity CRC for Emerging Infectious Disease (ABC: EID)	Belgium, Canada, China, France, Indonesia, Kenya, Malaysia, NZ, Thailand, Philippines, Uganda, UK, US
CRC for Innovative Grain Food Products	Syria, Indonesia, UK, NZ, US, Italy, Netherlands
CRC for Forestry	Belgium, NZ, South Africa, NZ, US, Japan, Canada, Portugal
CRC for National Plant Biosecurity	NZ, US, Thailand, Laos, Czech Republic, France, Italy, Netherlands, UK, Switzerland, Germany, France, Indonesia, Bulgaria, Canada
CRC for Beef Genetic Technologies	US, Canada, France, Ireland, South Africa, NZ, Korea Republic
CRC for an Internationally Competitive Pork Industry	Netherlands, NZ
Cotton Catchment Communities Cooperative Research Centre	China
Australian Seafood Cooperative Research Centre (Seafood CRC)	Vietnam, Mexico, Norway, NZ, US, Panama, Japan, Greece, Germany, China, Italy
Future Farm Industries CRC	US, France, Uruguay, Spain, Sweden, Denmark, India, Japan, UK, Netherlands, India, Canada, Italy, NZ
Information & Communication Technology	
CRC for Spatial Information	Germany
Capital Markets CRC	UK, Sweden, Hong Kong, Singapore, Canada, France
Australasian CRC for Interaction Design	US, Sweden, UK, Hong Kong, Norway, Cyprus, Germany, NZ, Denmark, India, China, South Africa
Mining & Energy	
CRC for Greenhouse Gas Technologies	US, South Africa
CRC Mining	US, South Africa
Parker CRC for Integrated Hydrometallurgy Solutions	US, Germany, Finland, South Africa, Canada, China, Germany, Korea Republic, Sweden , Japan

Appendix D - Intellectual Property and international research engagement

Intellectual property (IP) lies at the heart of knowledge-based economies. IP rights – such as patents, trade marks, plant breeder's rights and industrial designs – play a crucial role in facilitating technology transfer and knowledge exchange. These exclusive IP rights enable innovators to recoup the cost of investment in R&D and innovation. Without such an incentive, many innovations would never translate into new technologies, products and services that benefit our society. At the same time, excessive IP protection can discourage follow-on research and innovation, especially "where intellectual property rights are too easily granted, and where they are ambiguously defined".[20]

Getting the balance right – IP rights law reform

The Australian Government ten year innovation agenda – *Powering Ideas* – recognised that "the trick is to get the balance right: too little protection will discourage people from innovating because the returns are uncertain; too much protection may discourage people from innovating because the pathways to discovery are blocked by other intellectual property owners".[21] For a country such as Australia, which is a net importer of technology, it is critically important to ensure that the national patent system encourages the flow of knowledge and technology into the country, giving Australians access to new technology and helping them build on and enhance such technology.

One of the major reasons that Australian IP rights are susceptible to criticism both at home and abroad is the inventiveness threshold enshrined in the patents legislation.
To align Australia's inventiveness threshold with our major trading partners, IP Australia has embarked on an IP rights law reform project, which includes proposals by the Advisory Council on Intellectual Property, the Australian Law Reform Commission and the *Venturous Australia* report. The reform project aims to reduce barriers in the innovation landscape for researchers and inventors, improve certainty about the validity of granted patents, and allow patent claims to be resolved faster. If these proposed changes are adopted into law, patents granted in Australia will meet patent standards in other jurisdictions, which will provide greater certainty to Australian innovators and their collaborators. At time of writing, IP Australia is consulting on detailed text relating to the proposals, to ensure that there are no unintended adverse impacts, before proceeding to draft legislation.

Experimental use exemption

Another important aspect of the Government's commitment to encourage Australia's involvement in research collaborations is to improve use and flow of patented knowledge among scientists and researchers. This will enable them to experiment and explore new inventions in a non-commercial way, without being concerned about infringing other people's patents.[22] As part of the IP rights law reform project mentioned above, IP Australia is currently pursuing amendments to the *Patents Act* to introduce an experimental use exemption. Such an exemption will provide greater certainty to researchers and business as to where they can conduct cumulative research without infringing existing patents.

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[20] Cutler & Company *Venturous Australia: Building Strength in Innovation*, Melbourne, 2008
[21] Department of Innovation 2009, *Powering Ideas: An Innovation Agenda for the 21st Century*
[22] ibid

Enhanced use of patent information

The IP system is international and, as such, it is well placed to assist researchers and scientists to engage and connect across borders. The patent system in particular does this by enabling disclosure of new technologies into the public domain. Innovators can benefit from the disclosure. They can build on and enhance patented technologies, typically by negotiating licences with patent owners. They can also identify partners in the research field of their interest. However, patent information is voluminous and technical and not easy for innovators to access in a way that is useful for them. Improving access to patent information can thus assist in increasing Australia's involvement in global research networks. Commercialisation Australia will help to enhance access to such services and education for Australian researchers and innovators.[23]

[23] See <http://www.commercialisationaustralia.gov.au/WhatWeOffer/SkillsAndKnowledge/Pages/SpecialistAdvice.aspx>