



MONASH University

17 February 2010

Committee Secretary
Standing Committee on Industry, Science and Innovation
House of Representatives
PO Box 6021
Parliament House
Canberra ACT 2600

Dear Committee Secretary,

Thank you for the opportunity to comment on the Inquiry into Australia's International Research Collaborations.

In response to the call for submissions, Monash University is pleased to submit the following to the House of Representatives Industry, Science and Innovation Committee.

Your sincerely,

Professor Stephanie Fahey
Deputy Vice-Chancellor (Global Engagement)

MONASH UNIVERSITY'S SUBMISSION TO THE
INQUIRY INTO AUSTRALIA'S INTERNATIONAL RESEARCH
COLLABORATIONS

House Standing Committee on Industry, Science and Innovation

February 2010



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EXECUTIVE SUMMARY

- Monash discipline spread and multi-campus and international footprints position the university uniquely in the Australian system, giving its research, teachers and students perspectives, experiences and resources most other universities cannot match. Moreover, its active participation internationally provides students and staff opportunities to engage with local communities, foster comparative research, develop joint doctoral degrees, share knowledge and innovation and promote bilateral and multilateral research dialogues.
- Placing a value on international research collaborations as fundamental and core to Australia's innovation agenda and a key to being excellent.
- About 97 percent of the world's research is undertaken outside Australia. Australia needs to be actively involved and engaged.
- Advancing research programs through international linkages will help bring scale and complementary capabilities to global and national challenges.
- Connecting to global research helps increase efficiencies, is more cost-effective, eliminates duplication and achieves economies of scale.
- Researchers are increasingly more mobile, therefore positioning Australia as a competitive destination for excellent researchers decrease potential brain drain and ensures Australia is part of a global productive flow of researchers and talent.



BACKGROUND

Monash is the largest university in Australia with over 56,000 students. It is a comprehensive university undertaking research and teaching in science and technology, engineering, health and medical sciences, humanities and social sciences, and the creative arts. Monash is recognised for its excellence in research and scholarship and as a destination of choice for students both nationally and internationally. It is a member of Australia's Group of Eight (Go8) research-intensive universities and is one of the youngest universities in the world's top 50. (*Times Higher Education World University Rankings*)

Monash is distinguished among the Go8 due to its international reach and its size. Monash has eight campuses including one in Malaysia and one in South Africa, a centre in Prato, Italy, and a joint research academy in India making it Australia's most international university. Monash actively recruits talented staff from around the world and currently employ more than 14,900 staff worldwide (7270 full-time equivalent). About 19,000 of our total student cohort are international students studying on all our campuses. Equally through our international graduates, Monash has unmatched influence beyond Australian borders. The university has established an alumni network of 235,000 graduates, with many working in leadership positions around the world. Monash's international reach and sizes position Monash to engage globally at a level and intensity unmatched by any other university.



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NATURE AND EXTENT

INTERNATIONAL PRESENCE

The nature and extent of Monash University's international engagement borders on being unique. Monash's history, particularly in the last twenty-five years, tells a story of a university that is bold, ambitious and experimental in the way it approaches internationalisation. Monash's international trajectory began in 1961 when it proactively accepted large number of foreign students from South and Southeast Asia under a Commonwealth countries joint initiative, the *Colombo Plan*. It is estimated that about 18,000 to 20,000 Colombo scholars studied in Australia between 1950 and the mid-eighties.

In the mid-nineties, Monash embarked on a highly ambitious international agenda to develop a global network of campuses and strategic alliances. The University established the Malaysian campus at Sunway in 1998 and Monash South Africa campus in Johannesburg along with Centres in

Prato, Italy and London, United Kingdom in 2001. Our centre in Prato continues to thrive as a hub for educational and research activities with European and American partners. Our campuses in Malaysia and South Africa are increasingly embedded within their domestic higher education system, contributing enormously and cooperating extensively with wide range public and private institutions. In Malaysia, for example, a total of 76 projects at our Sunway campus used national and private Malaysian research infrastructure in 2009, as compared to 22 projects in 2008. Collaborations with high quality external research institutions also increased, as reflected in jointly-published weighted publications increasing to 96 in 2009 from 30 in 2008. Similarly, jointly supervised PhDs increased to 37 in 2009 from 13 in 2008.

Research is increasingly internationalised. According to the OECD (*OECD Science, Technology and Industry Scoreboard 2009*), in the search for new technological competences, better adaptation to local markets, and lower research and development (R&D) costs, companies are moving their research activities abroad. An increasing number of corporations, governments and research institutes are turning to India for research and development that delivers effective, high impact solutions to many of the leading research issues in the world today from climate change and renewable energy to clean water, advanced engineering and biotechnology. In late 2008, the Indian Institute of Technology, Bombay (IITB) and Monash University joined forces to create a unique Joint Venture research academy that aims at enhancing research collaborations between Australia and India. This global research partnership is collaborative, multi-disciplinary and is attracting the best talent – students as well as academic and research staff – to deliver innovative solutions of strategic importance to Australia and India. While our joint research academy in India has already enrolled 42 PhD Indian students after a tremendous response of over 1,000 applications, the academy expects to grow to 350 by 2015. The IITB-Monash Research Academy aims to become a leading provider of contract research services and collaborative research in the Asia Pacific region and on the global stage through the establishment of cogent research program that is supported by high quality infrastructure.

INTERNATIONAL ENGAGEMENT

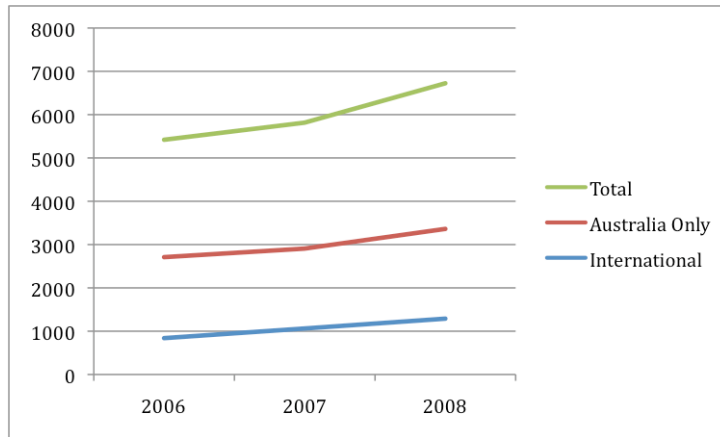
Monash's global strategy is to build on our international reach, expand our international connections, extend opportunities for our students and staff and differentiate ourselves from other Australian institutions. The extent and nature of Monash international research collaboration is largely expressed in three forms: (a) direct *researcher engagement*; (b) *research institutes*; and (c) *university-wide international partnerships and networks*

a) Direct researcher engagement

At the individual researcher level, international research collaborations have increased considerably. According to the Thomson ISI Database,

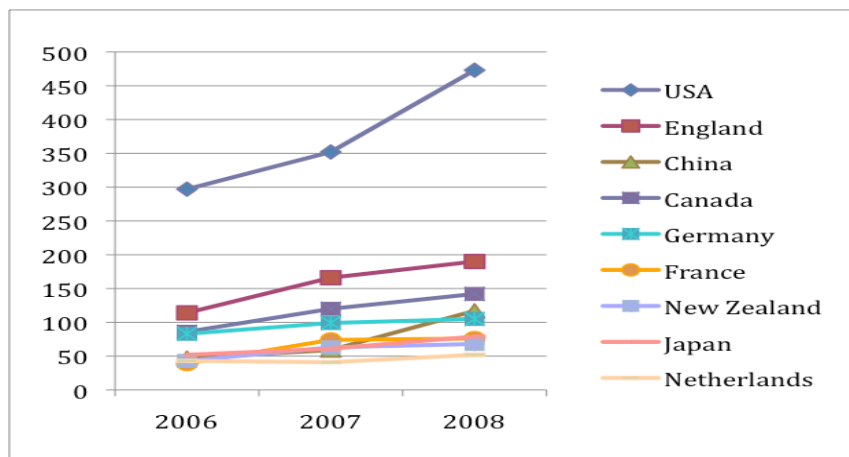
Monash University's international (non-Australian) joint publications have risen annually from 840 in 2006 to 1290 in 2008, representing 54 percent increase. (See Figure 1)

Figure 1: International (non-Australian) Publications - Thomson ISI Database



In terms of countries our researchers collaborate with, the United States is still a major collaborator, followed by the United Kingdom, Canada and Germany. Collaboration with China has however risen significantly since 2006 from 47 joint publications to 114 in 2008, representing about 149 percent increase.

Figure 2: International (non-Australian) Joint Publications based on Countries (Thomson ISI Database)



Our researchers are involved in a wide-range of international research collaboration activities. They include:

- **Joint research grants/projects** with researchers from partner universities.
- **Joint workshops and conferences** – An essential feature of international workshop/conference program is that research projects and publications will result from these types of activities. Many of these arrangements may also lead to visiting fellowships and joint research projects.
- **Visiting fellowships** – may take a form of visiting position at a partner university. Arrangements such as this tend to result in publications, joint conferences, expansion of the relationship beyond the individual or faculty and perhaps leading to joint research funding.
- **Guest lectures, teaching, editing special issue journals.**
- **Committee representation** – advising in international research foundations (eg. Gates Foundation), international organisations (eg. International Organisation for Standardisation (ISO)).
- **Co-supervising PhD students.**
- **Student visits and exchanges** - short term visits to use overseas research laboratories and facilities.
- **International agency funding** – collaborations that are supported by competitive funding from overseas agencies. For example, our researchers Professor John McNeil and Professor Richard Grimm of the Berman Centre for Outcomes and Clinical Research in the USA recently attracted \$25 million from the National Institute on Aging, part of the National Institutes of Health of the United States, for a trial of low-dose aspirin in people aged 70 and over. Preliminary funding of \$3.5 million for the trial was provided by the Australian government, through the National Health and Medical Research Council, with additional support from Victorian Cancer Agency, National Heart Foundation of Australia and Alfred Hospital Research Fund and Bayer Health Care.
- **Capacity building and research training** – Working in collaboration with universities in the developed countries to help build research skills and capacity in developing countries. For example, Monash is part of a consortium of African, American and British universities and research centres funded by the Wellcome Trust to build a critical mass of sustainable local research and

capacity across Africa, through strengthening African universities and research institutions.

These types of collaborations tend to be cultivated over a long period. They are largely informal and personal relationship based, involving regular visits and sharing similar research interests. Such collaborations attract little funding and tend to be supported by existing research projects. The outcomes of this mode of collaboration tend to be reflected in joint research publications.

b) Research Institutes

Monash University and its faculties are involved in innovative international research across a wide range of disciplines. In addition to the research expertise available in departments and schools, there are many internationally active discipline-specific research centres located within the University's 10 faculties and across its international campuses. The following section however focuses on a growing number of university-wide research institutes specializing in a wide variety of cross-disciplinary areas. The research institutes aims to build a community of researchers that engage in the highest quality innovative research with interdisciplinary engagement. A unique aspect of these research institutes is the way they complement Monash University's international reach and presence by taking on activities that are not only multidisciplinary and innovative in nature, but also international in its dimension. Following are selected snapshots of some of the exciting international collaborative initiatives driven by Monash key research institutes:

Monash University Accident Research Centre (MUARC)

Our Monash University Accident Research Centre (MUARC) is one of the most internationally connected research groups at Monash with its headquarters in Australia and research nodes in Malaysia, South Africa and Italy. MUARC's role has increasingly taken an international development dimension to its activities. In August 2008, MUARC established the *Injury Prevention and Safety Promotion (IPSP)* Research Node at Monash South Africa. The Node supports the conduct of health and injury prevention research with activities aligned with the Millennium Development Goals. In collaboration with Monash Faculty of Law, the Research Node is undertaking a comparative road safety law program in partnership with the University of Botswana with particular emphasis on road safety law in Botswana. The Research Node is also collaborating with the Ministry for Home Affairs in the Republic of Tanzania, and is focusing on key areas of data systems, drink-driving, speed education, enforcement programs and pedestrian safety.

Monash Sustainability Institute (MSI)

Monash Sustainability Institute (MSI) delivers solutions to key sustainability challenges through research, education and action. For government, business and community organisations, MSI is a gateway to the extensive and varied expertise in sustainability research and practice across Monash's faculties and research institutes. The Institute is actively involved in research collaborations that contribute to Australia's international development agenda. For example, it has multiple AusAID funded projects with a share theme on climate change (water, land management, forestry, community development, policy development, adaptation, mitigation). MSI is integrating approaches to climate change involving multidisciplinary projects across foreign agencies and participating organisations. Facilitated by MSI, the project will assist targeted policy development consistent with ecological sustainable development of natural resources. The collaboration involves government agencies and key universities in Vietnam, China, Indonesia, India and Cambodia.

In the past couple of years, MSI's research activities have further internationalized through its strategic partnership with the International Water Centre (IWC) to create the IWC-Africa Water Research Node at Monash South Africa. The Water Research Node pursues interdisciplinary and international research in addressing sustainability and water management challenges by leveraging the research capacity from across different disciplines, organisations and continents.

Monash eResearch Centre (MeRC)

Monash eResearch Centre (MeRC) uses cutting-edge information and communication technology (ICT) to empower researchers to collaborate globally. MeRC facilitates and enable global collaborative research through the development and customisation of collaborative services such as the use of remote broadcasting technology utilising High Definition Video; and using high performance computing and data storage and management. MeRC is working with Oxford University to connect Oxford and Monash Campus Grid to harvest spare CPU cycles from existing desktop PCs. MeRC has been working with Warwick University, to set up a High Definition videolink that will enable a closer exchange between our researchers by way of seminars, lecturing into programs at either end, as well as other applications. The use of high-end technology lessens the challenge of distance and promises to build richer engagement with fewer air travel.

Besides the delivering ICT service, MeRC is also an active member of the *Pacific Rim Application and Grid Middleware Assembly (PRAGMA)*. PRAGMA is an open organisation, which focus on practical solutions to create, support and sustain international science and technology collaborations via multidisciplinary and multi-institutional teams of researchers. These researchers are actively work together to develop or apply grid technologies to advance science. Through its active

participation in PRAGMA network, MeRC has extended its international research links to develop a research skills building program for its undergraduate students. The Monash University Research Project Abroad (MURPA) offers undergraduate students studying computer science or software engineering an exciting and unique opportunity to undertake an 8-week summer semester international research project at the prestigious University of California, San Diego (UCSD). The program provides students with a fantastic opportunity to work with world-renowned Monash and UCSD professors on cutting edge research projects and experience life in a leading international research laboratory.

Monash Asia Institute (MAI)

Monash Asia Institute (MAI) represents the Asian research and teaching expertise in all ten faculties on all Monash campuses in Australia, Malaysia and South Africa. MAI's has extensive multidisciplinary research and teaching links in Asia, North America and Europe. MAI in partnership with the Monash Sustainability Institute are mobilising expertise from across its international campuses and disciplines to work with major universities in India and Bangladesh on climate change adaptation and mitigation. The regional partnership will focus in particular on issues including disaster management, reduces emissions from deforestation and land degradation (REDD), the carbon economy, and social/economic. It will involve linking mid-career interdisciplinary academics through a structure visiting fellowships program, coordination of curriculum and research programs addressing climate change policy development and application. An enduring benefit will be a powerful regional network of universities in South Asia with a common focus on climate change.

c) University-wide international partnerships and networks

Partnerships

Over the past two years, the University had been working closely to build comprehensive university wide partnerships with three universities: *Warwick University* in the United Kingdom, *Sichuan University (SCU)* in China and *Arizona State University (ASU)* in the United States. This form of partnerships is an attempt to go beyond the traditional signing of memoranda of understandings concerning teaching, research and student exchanges. It seeks to focus each cooperation to the extent where it stretches and deepens into areas of complimentary and mutual interest such as teaching and learning; configuring bilateral, multilateral and thematic research teams to address global problems; and sharing of institutional policies, practices and even remote access to high-end research facilities. Recently, Monash and Warwick initiated a joint strategic fund to establish research projects that will combine the academic capability of both universities to create groundbreaking research in fields as diverse as stem cell science, intercultural studies, materials science, new media and astrophysics. The collaboration between leading scientists across both universities in materials

electrochemistry will create a leading international group in this area. Our strategic partnership with Arizona State University features research collaboration in material science and fluid dynamics, and emerging collaborations in sustainability. Our Sichuan partnership supports research projects in habitat mapping, stem cell science, European Union policy, information and communications technology, disease and disaster management, and established dual degrees in science and engineering. These three universities on three continents complement and add another layer to Monash's extensive international engagement in Southeast Asia, Southern Africa, Europe and South Asia.

The partnership with Warwick, ASU and SCU was but examples of the vigorous growth of our international collaborations in 2009, which saw new research and research training alliances with the *Chinese Academy of Sciences*, Singapore's *Agency for Science, Technology and Research (A*STAR)*, and research and education collaborations with a host of universities around the world. The research collaboration with the Chinese Academy of Science involved conducting nine projects, including development of clean energy technologies and the media and social representations of the influenza A virus H1N1. With A*STAR, Singapore, Monash signed two agreements to establish the Monash-A*STAR Research Attainment Program which provides Monash students the opportunity for PhD supervision under scholarship at A*STAR, and provide support to Monash staff seeking to connect with A*STAR researchers primarily in information technology and engineering.

Networks

In April 2009, Monash officially opened a \$153 million medical research centre, the *Australian Regenerative Medicine Institute (ARMI)*. ARMI will be one of the world's largest regenerative medicine and stem cell research hubs. Its research will focus on developing effective treatments for a range of currently incurable diseases, such as cancer, arthritis and other musculoskeletal conditions, diabetes and cardiovascular diseases. ARMI will also be the national headquarters for *EMBL Australia*, a new initiative capitalising on Australia's associate membership of the European Molecular Biology Laboratory, Europe's leading life science research laboratory. Through the creation of *EMBL Australia*, Australian research will be connected and internationalised. *EMBL Australia* will drive Australian research through local integrated research networks that connect global partnerships. It will drive enhanced research quality through the development of world-class scientific leaders. The centrepiece of *EMBL Australia* will be the Partner Laboratory Network of young research groups that will serve as a new paradigm for education, training and highly collaborative research across Australia. The objective is to enhance Australia's international competitiveness in the life sciences, and strengthen its emerging position as a leader in biotechnology research.

BENEFITS TO AUSTRALIA

There are a number of benefits to Australia from engaging in international research collaborations. They include:

- Many of the challenges faced in Australia are faced elsewhere, for example, an aging population, food and water security, climate change, social cohesion and people movements. Working with others who face similar challenges is the natural first step in enabling the sharing of knowledge and international comparisons.
- Advancing research programs with international partners that bring scale and complementary capabilities to global and national challenges.
- Connecting to global research gives our researchers access to research infrastructure, wider pool of resources and expertise not necessarily available in Australia. By having access and sharing facilities, it helps increase research efficiencies, is more cost-effective, and eliminates duplication and achieves economies of scale.
- Connecting to global research helps raise profile of the research undertaken in Australia. Such connection and relationship with high-performing international partner, for example, has not only the obvious benefits for the research of both partners, but also has a strong effect on our international visibility and impact. An international profile is essential in order for Australian researchers to achieve real influence in the research community – as research participants, programme chairs, editorial boards, advisers to international funding agencies, and invited speakers at major venues. This kind of profile is also key to being able to attract the best talent to Australia.
- Having foreign researchers visiting Australia through research collaboration activities, help expose our students to new ideas and approaches through teaching and supervision.
- Engaging in international collaborations ‘internationalises’ Australian research activities leading to higher quality of research outcomes.
- Access to high quality students undertaking higher degree research and post-doctoral training and exchanges. For example, one of the major benefits for researchers in collaborating with top-level universities abroad is that they gain access to high quality PhD students. In particular, Chinese universities for example usually run quite large Masters by research programs in which students often

publish two or three papers during their Masters. It is therefore easy to identify these top students who are frequently looking for opportunities to study abroad. These students have proven research credentials.

- Access to networks and ability to hire high achieving staff.
- Linking with international industry bodies increases the awareness of commercial imperatives/realities for the practical application of research and widens opportunities for industry-linked funding.

3

KEY DRIVERS

The key drivers of international research collaboration at the Government, Institutional and Researcher levels are:

Government level:

- About 97 percent of the world's research is undertaken outside Australia. Australia needs to be actively involved and engaged.
- To make Australia more productive and competitive by expanding the country's overall innovation capacity. (*Powering Ideas: An Innovation Agenda for the 21st Century*).
- The global scale, complexity and extent of issues such as climate change, food security, economic and financial governance and people movements are influencing governments to collaborate internationally.
- Researchers are increasingly more mobile, therefore positioning Australia as a competitive destination for excellent researchers decreases potential brain drain and ensures Australia is part of a global productive flow of researchers and talent.
- By funding programs, which seek to engage and support research at an international level, Australia is able to achieve economies of scale in delivering innovation outcome.
- International research collaborations enable international comparisons by encouraging comparisons between the methodology, indicators and output of the work of researchers done in other countries. For example, the key drivers for global movements research are the obvious need to understand developments in countries other than Australia, which may become the source of

asylum seekers or migrants (skilled or otherwise), and magnets to attract emigration from Australia. In the area of social cohesion, it is the comparisons between the methodology and output of the work of researchers done in other countries, such as the USA, Canada and Britain are of enormous importance to the positioning of interpretations of shifts in indicators of social cohesion in Australia.

Monash University level:

- Enhancing Monash research performance by undertaking innovative, multidisciplinary research addressing national and international priorities through the pursuit of knowledge and solutions from a global perspective.
- Advancing the university's primary aim of academic strengthening by ensuring Monash staff are connected with the international flow of the best ideas, people, technology and funding.
- Achieving critical mass in research and further breadth in education – through access to international resources and partnership – to enable Monash to contribute to global and national challenges.
- Providing our students and staff opportunities to move seamlessly between institutions in key areas.
- Achieving financial efficiencies by sharing the costs and overheads of projects, improving institutional processes through exchange of expertise and benchmarking.
- Transforming our students' experience through active participation in truly international programs that promote joint teaching and research, higher degree research mobility and exchanges. By further internationalising our students' experience within the context of a university engaged in major national and international challenges, our next generation of Monash research leaders will be equipped to contribute to these global challenges, and able to confidently operate and communicate across national boundaries.

Researcher level:

- Being involved in addressing the biggest global challenges.
- Aspiring to do internationally-recognised and quality research and engage with the world's best researchers in any field.
- Keeping abreast of developments in the field at an international level.

- Accessing wider range of funding sources and publishing opportunities.
- Accessing facilities and resources not otherwise available in Australia.
- Personal satisfaction of assisting developing nations and mentoring scientists with limited resources.
- Makes it viable to stay in Australia - access to ideas, thinking, expertise, as well as other perspectives. All of these things help a researcher to grow and mature in their work, to expand the contribution they can make to society as a whole as well as to the research community, peers and colleagues, and young, emerging and future researchers.
- Passion for international cooperation.

4

IMPEDIMENTS AND PRACTICAL MEASURES

There are a number of impediments faced by Australian researchers when initiating and participating in international research collaborations. The following highlights a number of impediments and offers some practical suggestion in addressing them:

- The current policy settings in Australia are not conducive to support long-term international research collaborations. For example, International Science Linkage support is no longer available, particularly in the middle of the European Union's €50 billion Framework 7 funding cycle. This discourages collaboration and the investment in resources to build linkages and it risk encouraging researchers back to working domestically.
- Because a lot of the research is done outside of Australia, our researchers need to be part of it. Travel then becomes a transaction cost when collaborating internationally. There is little access to sufficient funding in support of travel. Monash University does provide small funds in support of international collaborations, they are however insufficient to meet the significant growth in international research collaborations.
- Liberalising funding schemes: Placing less restrictions on funding regulation that prohibit expenditure of funds outside of funding nation – less restriction on this might assist the science to be conducted where it is best conducted.

- **Bilateral funding Initiatives:** The Australian Research Council (ARC) collaborates with overseas funding agencies to fund collaborative research proposals in targeted areas of research. In 2005, ARC signed an agreement with the Economic and Social Research Council of the United Kingdom (ESRC) to foster and support collaborative social science research and create networks linking individuals and centres in within Australia and the UK. Establishing similar schemes that match other funding schemes like the National Science Foundation and Engineering and the Physical Science Research Council will help considerably in supporting increased linkages.
- **EU Framework 7 –** The Australian-EU partnership framework makes a clear commitment to ‘strengthen cooperation between the EU and Australia in Science, Research, Technology and Innovation, Education and Culture to facilitate the movement of people’. There are a range of successful collaborations at Monash and our counterpart institutions that align with this aim. However, we think cooperation could be more effective via government commitment to better enabling Australian participation in Europe’s Framework Program. Currently Australian universities can cooperate in FP7 Cooperation programme projects. In exceptional circumstances they may gain funding from the EU for this. In normal circumstances the consortium will expect the Australian partner to source its own funding in order to participate.

When researchers based at Australian universities are part of a successful Framework Program application that has passed rigorous review in Europe, there is no guarantee that the Australian component will be funded, and funding pathways are limited (see next point). Since the Australian contribution to a project cannot be relied upon, our experience is that this can be disincentive to European consortia to include researchers based at Australian institutions.

The NHMRC has a dedicated – if limited – programme to support participation in FP7. The International Science Linkage (ISL) Scheme – administered by DIISR has provided some support for Australian researchers working outside of the area of health to participate in the Framework Programme, but this scheme is now concluded without a successor scheme having been announced. The ARC has no dedicated mechanism for directly connecting research with the Framework Programme. Possible improvements:

- **Development of mechanism –** possibly via direct Australian contribution/accession to the Framework Programme (a route already taken by Israel) – for research support in targeted areas of bilateral concern (eg. energy). This might be designed in a single process to assure all parties (including European counterparts) that funding will be assured if the project is successful in a competitive process, reducing the risk involve in including Australian researchers.

- Commitment to strategic and more thorough harmonisation of domestic funding schemes so that Australian funding pathways, or thereof, better address current international collaboration obstacles. Alternately, further liberalisation of domestic funding to enable international collaboration, on the recognition that international collaboration is part of the core business of performing cutting edge research.
- A greater commitment to the COST (Cooperation in Science and Technology) initiative. This is a European-led scheme that supports the alignment of nationally funded research initiatives. It is not part of the Framework Programme, but it has the reputation as an important incubator for Framework Programme projects. A limited amount of funding has been made available for this via the now concluded ISL program.
- Long term collaboration: Support strategic research that is long term, well resourced, multi-disciplinary research. This will encourage investment in resources (particularly capability) and build confidence among participating international research agencies. Short-term investment in research, for example one year, does not allow long-term planning necessary for strategic research.
- Visiting Fellowships: Visiting fellowships is one way in which long term connections can be built and maintained. Having a mechanism to enable long-term collaboration is essential. In Europe, the Marie Curie Scheme is overtly about career development and linkages. The scheme encourages researchers to spend 2 – 3 years abroad, yet bonds them back to their country and institution.
- Visiting Fellowships for Early Mid-Career: It is harder for early career researchers to go global during the early part of their research career. There is lack of resources and time available is limited. Creating a special scheme, similar to the Marie Curie, would be invaluable in assisting early-mid career researchers internationalise their research and build potential research links early in their career.
- Most academics do not have discretionary funding to initiate contact and do not have time to maintain collaborations if they are not seen to be productive. There are three schemes that are open to Australian researchers, and that foster the best researchers doing the best research: the Australian Academy of Sciences Travelling Fellowships, the Human Frontier Science Program (HFSP) Short Term Fellowships and the HFSP Collaborative Research Grants. The two fellowships (AAS and HFSP) are available for short term stays in top laboratories or institutes overseas are awarded on the excellence of the applicant and the excellence of the place to be visited. The HFSP Grants are awarded based on the excellence of the applicant and the excellence of the research project.

- A number of flexible, multi-round (per year) grant schemes. Multiple granting bodies in Australia.

5

PRINCIPLES AND STRATEGIES

The principles and strategies for supporting international research engagement include:

Placing a value on international research collaborations as fundamental and core to Australia's innovation agenda and a key to being excellent.

Recognising that Australia's geography and distance from the main research hubs, particularly in the northern hemisphere, is an impediment. Improving information and communications technology infrastructure and using cost-effective video conferencing tools will provide an effective solution to communications. However technology has its limits. It does not bring a lot of people together in a same room. Technology becomes an effective tool for promoting on maintaining ongoing activity. However, face-to-face degree of serendipity plays an important role in promoting long-term collaborations. Increasing funding for programs that supports Australian researchers participation and connection to global research, encouraging and supporting international exchange for research students and early-mid career researchers, encouraging and supporting Fellowships outside of Australia; supporting lab-based work and clusters so that research leaders can initiate exchanges for their students are key elements to enhancing Australia's international research collaborations.

Commitment to strategic and more thorough harmonisation of domestic funding schemes so that Australian funding pathways, or thereof, better address current international collaboration obstacles. Alternately, further liberalisation of domestic funding to enable international collaboration, on the recognition that international collaboration is part of the core business of performing cutting edge research.