

HOUSE OF REPRESENTATIVES STANDING COMMITTEE ON INDUSTRY, SCIENCE
AND INNOVATION

INQUIRY INTO AUSTRALIA'S INTERNATIONAL RESEARCH COLLABORATIONS

AUSTRALIAN RESEARCH COUNCIL (ARC) SUBMISSION

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1. BACKGROUND

1.1 This submission

On 25 November 2009, the Minister for Innovation, Industry, Science and Research asked the House of Representatives Standing Committee on Industry, Science and Innovation to inquire into and report on international research engagement with particular reference to:

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

The ARC welcomes the opportunity to make a submission to this inquiry. The submission focuses on the ARC's role in supporting international research collaboration. Additional information is provided in the attachments.

1.2 The Australian Research Council

The ARC is a statutory authority within the Australian Government's Innovation, Industry, Science and Research portfolio. Its mission is to deliver policy and programs that advance Australian research and innovation globally and benefit the community.

The ARC provides advice to the Government on research matters and manages the National Competitive Grants Program (NCGP). Funding provided through the NCGP is a key part of the competitive arm of the dual funding model for higher education research.

Through the NCGP, the ARC supports the highest quality fundamental and applied research and research training across all disciplines. The NCGP supports two main streams of research funding – Discovery, under which funding is made available for investigator-initiated research and research fellowships, and Linkage, under which research projects, infrastructure, fellowships and centres are funded jointly with partner organisations in the private sector, government or the community. Funding is allocated on the basis of a competitive peer review process.

On 26 February 2008, the Minister for Innovation, Industry, Science and Research announced that a new *Excellence in Research for Australia* (ERA) initiative would be developed by the ARC in conjunction with the National Health and Medical Research Council (NHMRC) and the Department of Innovation, Industry, Science and Research (DIISR). ERA will assess research excellence within Australia's higher education institutions using a combination of metrics and expert review by committees comprising experienced, internationally-recognised experts.

Further information on the ARC is at **Attachment A**.

2. ARC SUPPORT FOR INTERNATIONAL COLLABORATION

2.1 Policy context

In May 2009 the Australian Government released *Powering Ideas: An Innovation Agenda for the 21st Century*. Powering Ideas, which was developed following an extensive consultation process, sets a 10-year reform agenda to make Australia more productive and more competitive. It is supported by a \$3.1 billion boost in funding over the next four years.

As part of the agenda, the Government has adopted seven National Innovation Priorities to ‘focus the production, diffusion and application of new knowledge; and address the country’s long term weakness in business innovation and in collaboration between researchers and industry’. One of the National Innovation Priorities relates directly to international collaboration –

Priority 6: Australian researchers and businesses are involved in more international collaborations on research and development.

In this context the report notes that ‘Australia produces three per cent of the world’s formal research and that our capacity to innovate depends very much on how effectively we harness and apply the other 97 per cent’.

The report also articulates a number of specific policy ambitions for Australia including one to increase international collaboration in research by Australian universities. The report refers to this being achieved by (among other things):

- ‘building on actions to open important Australian Research Council awards and fellowships to international applicants, and increase multilateral engagement (for example, in the Square Kilometre Array radio-telescope project)’;
- ‘using Excellence in Research for Australia to ensure that our universities researchers can hold their own in international company’; and
- ‘supporting dialogue between researchers, collaborative research project and joint research infrastructure’.

Within the Australian Government, DIISR has a lead role in instigating and managing intergovernmental science and research relationships across the whole spectrum of science and research¹. It also administers a number of funding programs which aim specifically to support international collaboration (for example, the *International Science Linkages Program*) as well as other programs aimed at building Australia’s research capacity including through the development of stronger collaborative linkages (for example, the *Cooperative Research Centres Program*).

In addition to the activities of DIISR:

- research funding agencies such as the ARC and NHMRC support international collaboration through their funding schemes;
- Government funded research agencies, such as the CSIRO, conduct research with international engagement; and
- other Commonwealth Government departments pursue country agreements in specific thematic areas for which they have portfolio responsibility.

¹ *International Science and Research Engagement Fact Sheet*, Department of Innovation, Industry, Science and Research (www.innovation.gov.au)

2.2 Mechanisms of support for international collaboration

Strategic overview

The *ARC Strategic Plan 2009–10 to 2011–12* was released in August 2009. It identifies the strategies the ARC will undertake over the coming three years in pursuit of the five key objectives set out in the plan which are:

- Research: To support excellence in research;
- Capacity: To build Australia's research capacity;
- Policy: To provide informed high quality policy advice to Government;
- Evaluation: To enhance research outcomes through effective evaluation; and
- Promotion: To raise the profile of Australia's research effort and to be an effective advocate for its benefits.

In preparing its strategic plan the ARC made a conscious decision not to identify international research collaboration as a separate objective, but rather to incorporate it as a theme in the strategies underpinning all five key objectives. The relevant strategies reflect the ARC's support for international engagement in three broad areas:

- providing funding support for research through the NCGP;
- building Australia's research capacity more broadly, for example, through ERA; and
- participating in international forums.

This submission focuses on support for international engagement delivered through the ARC's administration of the NCGP and its role in developing ERA.

National Competitive Grants Program

The ARC's support for international collaboration has gone through a number of iterations since the agency was first established in the late 1980s. Elements of the support have included:

- provision of fellowships under agreements with research agencies in specific countries;
- establishment of the International Researcher Exchange Program (the predecessor of the *Linkage International* scheme) offering International Fellowships and Awards;
- the expansion of fellowship support to all countries; and
- the introduction of International Coordinated Initiatives under the *Linkage International* scheme to stimulate collaboration in specific areas.

In the most recent developments in early 2008 the Minister for Innovation, Industry, Science and Research, Senator the Hon. Kim Carr, announced that ARC fellowships would be progressively opened to greater international competition and other improvements would be made to ARC schemes in order to create and enhance international collaboration opportunities for the Australian research community.

Due to the mainstreaming of support for international collaboration the *Linkage International* scheme (which provided support through Awards, Fellowships and Internationally Coordinated Initiatives throughout its history) was discontinued.

Under the mainstreaming of support for international collaboration:

- a new category of International Collaboration Awards (ICAs) was established under the *Discovery Projects* scheme – providing funding to enable researchers to travel overseas, or Partner Investigators living overseas to travel to Australia, to work on their projects for between one and six months.
- all ARC fellowships and postgraduate awards have been progressively opened to international candidates.
- overseas higher education organisations, or entities closely related to such organisations, were made eligible to be Partner Organisations under the *Linkage Projects* scheme, provided there is one Australian Partner Organisation involved with the project. Previously, only overseas companies and government research bodies were eligible to be partner organisations.
- Partner Investigators can now request funding for international travel associated with a project funded under the *Discovery Projects* or *Linkage Projects* schemes. (This took effect in the funding rules for funding commencing in 2010.)

Additional details of these initiatives are provided in **Attachment B**.

While it is too early to determine the full impact of these changes they have been welcomed by ARC-funded researchers – maximising opportunities for researchers to attach international collaboration to a research project and minimising the administration associated with the need to make separate applications under different schemes. This approach was identified as best practice in a report on the international policies and activities of the United Kingdom (UK) Research Councils².

Excellence in Research for Australia

As noted elsewhere in this submission, the ERA initiative aims to identify and promote excellence across the full spectrum of research activity in Australia's higher education institutions. ERA reflects the Australian Government's commitment to a transparent, streamlined approach to the evaluation of the quality of research undertaken in Australia's universities.

ERA has the potential to play a significant role in drawing attention to Australia's research strengths and influencing international interest in work undertaken by Australian researchers. Promotion of Australia's research excellence through initiatives such as ERA is important in:

- encouraging investment in Australia;
- attracting researchers to Australia; and
- promoting excellent researchers with whom overseas researchers can form links.

A key issue is communicating information to other researchers and research students about opportunities for collaboration and for training the future research workforce (including international opportunities). ERA will provide information to other countries about Australia's research strengths and opportunities for collaboration with research areas in individual universities. ERA can also assist in providing information to prospective postgraduate research students about the best locations for carrying out Masters or Doctorates by Research.

² *International Policies and Activities of the Research Councils – Ninth Report of Session 2006-07, House of Commons Science and Technology Committee*

2.3 Profile of international research collaboration supported through the NCGP [see also Attachment C]

Targeted funding initiatives

International Collaboration Awards (ICAs) were introduced for the first time in the *Discovery Projects* selection round for funding commencing in 2010³.

- *One hundred and seventy-three ICA requests were awarded within 98 successful proposals. This represents an ICA request success rate of 15.0 per cent. The greatest number of ICAs was awarded to researchers from Australia (34.1 per cent), the USA (22.0 per cent), Germany (7.5 per cent) and the UK (7.5 per cent).*
[see Tables 1a and 1b, Attachment C]

[Proposals for funding commencing in 2010]	Number received	Number funded	Success rate
Discovery Projects proposals involving ICA requests	646	98	15.2%
ICA requests	1151	173	15.0%

Instances of international collaboration

Most international research collaboration activities are a natural result of the ARC's general support for research.

In submitting a research proposal to the ARC for funding through the schemes of the NCGP, applicants are asked to identify whether the proposal involves international collaboration, and if so, with which countries. Proposals involving 'formal' linkages are identified as those proposals involving a partner investigator or partner organisation from overseas.

- *Just over half of the total number of projects funded under the NCGP commencing in 2009 (submit year 2008) indicated that they involved international collaboration (ranging from 37.9 per cent for the Linkage Projects scheme to 100.0 per cent for the Australian Laureate Fellowships scheme).*
[see Tables 2a and 2b, Attachment C]

Scheme	% of all funded proposals commencing in 2009
Australian Laureate Fellowships	100.0%
Future Fellowships	84.0%
Discovery Projects	59.8%
Linkage Infrastructure, Equipment and Facilities	38.4%
Linkage Projects	37.9%
Total	56.5%

³ ICAs may be awarded to Chief Investigators (CIs)/Fellows to work in overseas research organisations on the project with Partner Investigators living overseas, and PIs living overseas to work in Australia on the project with CIs/Fellows. ICAs are available for 1 to 6 months for a maximum of 1 per CEI/Fellow or overseas PI per year of the project. ICAs comprising funding for airfares, local travel, a living allowance and consumables. If approved, the funding contribution is limited to a maximum rate of \$40,000 for up to six months.

- *The proportion of Linkage Projects grants involving international collaboration has been gradually increasing (from 22.6 per cent in 2002 to 37.9 per cent in 2008). [see Table 2b, Attachment C]*

Scheme	Proposals submitted						
	2002	2003	2004	2005	2006	2007	2008
Discovery Projects	51.6%	52.9%	56.3%	61.0%	63.6%	58.9%	59.8%
Linkage Projects	22.6%	28.6%	25.6%	26.5%	34.6%	32.7%	37.9%
Total	45.0%	53.2%	51.6%	53.7%	56.5%	52.9%	56.6%

- *The largest number of linkages recorded on proposals funded between 2002 and 2008 are with the United States of America (USA), followed by the United Kingdom (UK) and Germany. Collaboration with China has been increasing (3.7 per cent in 2008, up from 2.8 per cent in 2002). [see Table 3 and Figure 1, Attachment C]*

Top 10 countries	% of total instances of collaboration [total funded proposals commencing between 2002 and 2008]
USA	23.5%
UK	14.8%
Germany	7.8%
Canada	5.8%
France	5.6%
Japan	5.0%
China	3.7%
New Zealand	3.1%
Italy	2.6%
Netherlands	2.5%

- *Of the total projects funded between 2002 and 2008 which indicated they involved international collaboration, 16.9 per cent were in the field of Engineering and Technology, followed by Biological Sciences (14.6 per cent) and Physical Sciences (9.9 per cent). [see Table 6, Attachment C]*

Top 10 disciplines	% of funded proposals commencing between 2002 and 2008
Engineering and technology	16.9%
Biological sciences	14.6%
Physical sciences	9.9%
Chemical sciences	8.1%
Information, computing and communication sciences	7.0%
Earth sciences	6.2%
Mathematical sciences	6.0%
Behavioural and cognitive sciences	4.4%
Medical and health sciences	3.5%
History and archaeology	3.4%
Studies in human society	3.4%

- *Of the total number of projects funded between 2002 and 2008, approximately 23 per cent involve 'formal' linkages, that is, a partner investigator or partner organisation from overseas. The proportion of projects with formal linkages has been slowly increasing under the Discovery Projects and Linkage Projects schemes.*
[see Tables 7, 8 and 9 and Figures 2, 3 and 4, Attachment C]

	Discovery Projects	Linkage Projects
Formal	22	18
Informal	36	13
No collaboration	42	70
Total	100	100

International collaboration in publications arising from ARC funded research

In 2008 the ARC commissioned a study to assess the performance of publications attributable to ARC funded research in attracting citations in the wider international research literature, to compare that performance with the impact of publications arising from elsewhere in the Australian research system and to benchmark it against world performance.

- *The study found that collaboration is stronger internationally than nationally and that the level of international collaboration stands at 40 per cent for all Australian output and slightly above this for output from ARC-funded research. Further information on the findings of the study is in **Attachment D**.*

Mobility of researchers

The ARC invests in the development, attraction and retention of excellent researchers through its fellowships schemes.

- *In the first selection rounds conducted under the Australian Laureate Fellowships and Future Fellowships schemes, approximately 20 per cent of fellowships awarded went to returning Australians or foreign nationals.* [see Table 10a, Attachment C]
- *In the most recently completed rounds of schemes involving fellowship awards, the highest number of fellowships was awarded to foreign national researchers from China, Germany and Canada, closely followed by the UK and the USA.*
[see Table 10b, Attachment C]

Top 5 countries	% of all funded proposals
China	14%
Germany	11%
Canada	9%
UK	8%
USA	7%

Encouraging overseas investment

Through the *Linkage Projects* scheme the ARC supports collaborative research projects between university researchers and partner organisations (including industry, government and non-profit organisations). Under the program partners are required to make matching cash or in-kind contributions to the cost of the research project.

- *Of total partner organisations recorded on grants commencing in 2009 approximately 14 per cent indicated that they were international organisations⁴. These organisations pledged contributions totalling \$37.4 million from international companies, \$4.6 million from international government organisations and \$6.0 million from international non-profit organisations. [see Tables 11a and 11b and Figure 5, Attachment C]*

Type of partner organisation	Number of partner organisations	Funding contribution of partner organisations (\$m)
Company		
Australian	291	81.9
International	96	37.4
Government		
Commonwealth	51	10.1
State and local	346	82.6
International	17	4.6
Non-profit		
Australian	179	33.0
International	32	6.0

Access to international research facilities

Through the NCGP, in particular the *Linkage Infrastructure, Equipment and Facilities* and *Special Research Initiatives* schemes, the ARC supports access by Australian researchers to international research facilities and initiatives.

- *Under the Linkage Infrastructure, Equipment and Facilities scheme the ARC currently (in 2010) supports access by Australian researchers to six international research facilities or projects [see Table 12, Attachment C]:*
 - *Advanced Laser Interferometer Gravitational-Wave Observatory (LIGO) Project – the first gravitational wave observatory capable of frequent observation of known sources of gravitational waves leading to the birth of gravitational wave astronomy.*
 - *Advanced Synchrotron Radiation Facility – the Australian National Beamline Facility program at the Photon Factory, Japan.*
 - *Australian High energy Physics Program – works on number of international experiments at the European Organisation for Nuclear Research (CERN) and National High energy Physics Laboratory (KEK) in Japan.*
 - *ISIS Neutron Spallation Source – a partnership with the world’s leading pulsed neutron source, ISI in the United Kingdom.*
 - *Integrated Ocean Drilling Project – an international marine research program that explores Earth’s history and structure recorded in seafloor sediments and rocks and monitors sub-seafloor environments.*
 - *International Gemini Project – a partnership of seven countries (Argentina, Australia, Brazil, Canada, Chile, the UK and US) undertaken to build and operate a pair of 8 metre telescope in Hawaii and central Chile. Gemini is the only pair of telescopes giving full coverage of both the northern and southern skies.*

⁴ The classification of partner organisations on application forms is made by the individual partner organisations and not checked by the ARC.

- *In March 2008 Australia became an Associate Member of EMBL – the European Molecular Biology Laboratory. The ARC and The University of Sydney are currently supporting Australia’s first recipient of an EMBL Group Leadership position, Dr Marcus Heister. Dr Heister will spend five years from 2009 at EMBL Heidelberg and an additional four years from 2014 at The University of Sydney. ARC funding is being provided through its Special Research Initiatives scheme which can be used to fund the cooperative development of national and international linkages (among other things).*

Building scale and focus

Through the NCGP, in particular the *Linkage Infrastructure, Equipment and Facilities* and *Special Research Initiatives* schemes, the ARC supports access by Australian researchers to international research facilities and initiatives.

- *A key objective of the ARC Centres of Excellence scheme is to build new networks with major world-class centres and research programs, including those located overseas. ARC Centres of Excellence attract a large number of international visitors and students to work in them or to engage in discussions and information exchange.*
[see Table 13a, Attachment C]
- *The ARC has been a co-investment partner in the establishment of four centres of research excellence: the Australian Centre for Plant Functional Genomics, the Australian Stem Cell Centre, National ICT Australia, and the National Centre for Groundwater Research and Research Training. The collaborating organisations in each of these centres include universities, national and international research organisations and industry participants.*

SECTION 3: ADDITIONAL COMMENTS

3.1 Nature and extent of international collaboration (TOR1)

The nature and extent of international collaboration supported through ARC-funded research is outlined in Section 2 of this submission.

3.2 Benefits from engaging in international research collaborations (TOR2)

The benefits from engaging in international research collaborations have been widely articulated. They include:

- strategic participation of researchers in leading edge international research projects
- access to facilities, new technology and to large-scale research projects that are beyond the ability of Australia to finance alone
- access to a large pool of expertise, new fields of research and new practices and models of research
- the building of Australian research capability in terms of growth of knowledge, membership of networks and development of local expertise to international standards
- greater chance of forming contacts that will enable Australian scientists to become providers of R&D to multinationals that are outsourcing a large proportion of R&D
- the attraction of high quality researchers to Australia.

3.3 Key drivers of international research collaboration (TOR3)

Drivers of international research collaboration at the government, institutional and researcher levels include the following:

- Government
 - leveraging investment in research
 - building research capability
 - participation in consideration of global issues
 - access to international facilities
 - building diplomatic relationships
- Institutional
 - building research capacity (including training of researchers)
 - enhancing international reputation (with spin-off benefits for international students)
- Researchers
 - exchange of ideas
 - access to latest trends and thinking
 - access to equipment and infrastructure
 - exchange of personnel and expertise.

A discussion of the drivers of policies to support international collaboration in research can be found in a report commissioned by the European Commission – Drivers of International Collaboration in Research Final Report (2009).

With growing evidence of the benefits of international collaboration, most national research agencies worldwide are focussing increasing attention on international research collaboration including the international mobility of scholars. Most have articulated a strategy or strategies to support international engagement (see **Attachment E**) involving a number of similar themes.

It is important in this context that the ARC continues to monitor developments overseas as changes may need to be made to policies and programs to ensure continued access for Australian researchers.

3.4 Impediments faced by Australian researchers when initiating and participating in international research collaborations (TOR4)

Institutions would be better placed to comment on this issue.

3.5 Principles and strategies for supporting international research engagement (TOR5)

Important elements of a national strategy for international research engagement include:

- *a coordinated vision or whole-of-government approach.* In that vision the links between different elements of the research and innovation system need to be clearly articulated. Coordination of activities is critically important as the associated policy issues transcend individual agencies. The Prime Minister's Science Engineering and Innovation Council and the Coordination Committee on Innovation have an important role to play in this regard.
- *metrics for measurement of performance.* It can be difficult to 'measure' international collaboration because relationships are often developed and maintained at the researcher to researcher level, with little reference to mechanisms offered by Government. Nevertheless it is an important element of any international strategy.
- *a balance of activities including directed and undirected support.* ARC support for international collaboration is largely investigator-initiated, that is, there is no requirement that a particular country is privileged over another in access to research collaboration. This approach is appropriate in that it allows the ARC to support excellence wherever it arises. Notwithstanding this, it is also important to target resources to activities and objectives that have been identified as being of the highest priority.
- *effective promotion abroad of Australia's research capability and the potential for international collaboration.* In the increasingly competitive environment, Australia must actively strive to be a favoured partner for research.

THE AUSTRALIAN RESEARCH COUNCIL**Background**

The Australian Research Council (ARC) is established as a statutory agency under the *Australian Research Council Act 2001* (the Act). It consists of a Chief Executive Officer (CEO) appointed by the Minister under the Act, designated committees appointed by the Minister to assist the CEO, and staff engaged under the *Public Service Act 1999*. Under the Act, the functions of the ARC are:

- to make recommendations to the Minister in relation to approval of proposals from organisations for funding of research programs;
- to administer financial assistance approved by the Minister for research programs; and
- to provide advice to the Minister on research matters.

National Competitive Grants Program

In 2009–10 funding for the NCGP will total \$652.831 million. Together with funding for the ERA initiative, this accounts for 7.7 per cent of the Australian Government's 2009–10 \$8.587 billion commitment to science and innovation.

The NCGP is administered by the ARC on behalf of the Australian Government to provide:

- support for the highest-quality research leading to the discovery of new ideas and the advancement of knowledge;
- financial assistance towards facilities and equipment that researchers need to be internationally competitive;
- support for the training and skills development of the next generation of researchers; and
- incentives for Australia's most talented researchers to work in partnership with leading researchers throughout the national innovation system and internationally, and to form alliances with Australian industry.

The NCGP comprises a set of elements structured to provide a pathway of incentives for Australian researchers developing research capability under two elements – Discovery and Linkage. The main schemes of the two elements are listed in Table 1. Further details are provided in Attachment A1.

The ARC schemes fund individual research projects, research fellowships, postgraduate awards, infrastructure acquisition and research centres. The schemes provide for proposals to be submitted to the ARC and assessed and ranked in a comprehensive peer review process. Funding recommendations are made to the Minister by the ARC CEO.

In 2008–09 the ARC managed the assessment of 5575 proposals under 11 selection rounds conducted for funding commencing in 2009. Funding was awarded to 1438 (25.8 per cent) of these proposals.

Table 1: Funding schemes of the NCGP

Schemes	
Discovery	Australian Laureate Fellowships (from 2009) Discovery Indigenous Researchers Development Discovery Projects Future Fellowships (from 2009) Super Science Fellowships (2009–10)
Linkage	ARC Centres of Excellence Co-funded Centres Linkage Infrastructure, Equipment and Facilities Linkage Learned Academies Special Projects Linkage Projects Special Research Initiatives

Excellence in Research for Australia

On 26 February 2008 the Minister for Innovation, Industry, Science and Research, Senator the Hon. Kim Carr, announced his plans for a new research quality and evaluation system.

The objectives of the initiative – the *Excellence in Research for Australia* (ERA) initiative – are to:

1. establish an evaluation framework that gives government, industry, business and the wider community assurance of the excellence of research conducted in Australia's higher education institutions;
2. provide a national stocktake of discipline-level areas of research strength and areas where there is opportunity for development in Australia's higher education institutions;
3. identify excellence across the full spectrum of research performance;
4. identify emerging research areas and opportunities for further development; and
5. allow for comparisons of Australia's research nationally and internationally for all discipline areas.

ERA will undertake evaluations across eight clusters of disciplines. These clusters are:

- Cluster One—Physical, Chemical and Earth Sciences;
- Cluster Two—Humanities and Creative Arts;
- Cluster Three—Engineering and Environmental Sciences;
- Cluster Four—Social, Behavioural and Economic Sciences;
- Cluster Five—Mathematical, Information and Computing Sciences;
- Cluster Six—Biological and Biotechnological Sciences;
- Cluster Seven—Biomedical and Clinical Health Science; and
- Cluster Eight—Public and Allied Health Sciences.

Data for ERA will be submitted at the four-digit Field of Research (FoR) level. Indicators are calculated based on the submitted data for each institution at the four-digit and two-digit FoR levels, and this information is aggregated to create four-digit and two-digit Units of Evaluation. Units of Evaluation are assessed and rated by Research Evaluation Committees (RECs) which are grouped by cluster.

The RECs, comprising experienced, internationally-recognised experts, will evaluate the overall research performance of disciplines within institutions. These evaluations will be informed by four broad categories of indicators:

1. *Indicators of research quality* Research quality is considered on the basis of ranked outlets, citation analysis, ERA peer review, and peer-reviewed Australian and international research income.
2. *Indicators of research volume and activity* Research volume and activity is considered on the basis of total research outputs, research income and other research items within the context of the profile of eligible researchers.
3. *Indicators of research application* Research application is considered on the basis of research commercialisation income and other applied measures.
4. *Indicators of recognition* Research recognition is considered on the basis of a range of esteem measures.

The ARC will publicly release outcomes of the evaluations for all disciplines at the four- and two-digit level. This information will be published at an institutional and a national level. The ARC will also make available to individual institutions further information on the evaluations of their own disciplines.

ERA will inform the performance component of the *Sustainable Research Excellence in Universities Program*. The eligibility of institutions for funding from the *Sustainable Research Excellence in Universities Program* will be contingent on their participation in ERA. The Government will determine how the allocation of other Research Block Grants may be linked to ERA results in consultation with the higher education sector.

During 2009 the ARC conducted trials in two discipline clusters – Physical, Chemical and Earth Sciences and Humanities and Creative Arts. The outcomes of these trials were announced on 30 November and 14 December respectively (www.arc.gov.au/era/trial.htm). All eight clusters will be evaluated as part of the full ERA process.

FUNDING SCHEMES OF THE NATIONAL COMPETITIVE GRANTS PROGRAM

Details of schemes

Table 1: Discovery schemes

Australian Laureate Fellowships	
Frequency	One selection round per year (commenced 2009)
Purpose	To: attract and retain outstanding researchers and research leaders of international repute; build and strengthen world-class research capability in Australia; provide an excellent research training environment and exemplary mentorship; nurture early-career researchers; expand Australia's knowledge base by supporting ground-breaking, internationally competitive research; forge strong links among researchers, industry and the international research community; and support research that will result in economic, environmental, social or cultural benefits for Australia.
Features	<ul style="list-style-type: none"> • Duration: Australian Laureate Fellowships have a standard tenure of five years. • Size of grant: The level of salary supplement is \$100 000 per annum (2008 dollars) plus 28 per cent on-costs. Administering organisations are required to provide a salary of a Level E professorial appointment (or equivalent). • Up to 15 fellowships are awarded each year. The scheme is open to proposals from outstanding researchers of international repute, currently working in Australia or overseas.
Eligibility	Eligible higher education institutions: Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS); museums and herbaria; research organisations funded by state and territory governments and other Australian Government sources.
Roles	Australian Laureate Fellow
Criteria	Investigator (40%); project/program of research activity (40%); and mentoring/capacity building (20%)
Reference	Australian Laureate Fellowships funding rules for funding commencing in 2010
Discovery Indigenous Researchers Development (DIRD)	
Frequency	One selection round per year
Purpose	To: develop the research expertise of Indigenous researchers who have not participated as a Chief Investigator on a project funded under any of the ARC's other funding schemes or previously been awarded an ARC Fellowship; support fundamental research and research training by Indigenous Australian individuals and teams; provide Indigenous Australian researchers with experience in the preparation of research funding proposals; and expand Australia's knowledge base and research capability.
Features	<ul style="list-style-type: none"> • DIRD supports research projects and fellowships. Indigenous Researcher Fellowships are awarded at the postdoctoral level. Australian Research Fellowships - Indigenous are awarded to experienced researchers. • Duration: Grants may be awarded for one to three years and the fellowship is for one or two years' full-time employment on an approved project. • Size of grant: Grants range from a minimum of \$10 000 per calendar year to a maximum of \$200 000 over the life of the project.
Eligibility	Eligible higher education institutions; museums and herbaria. Researchers must be of Australian Aboriginal or Torres Strait Islander descent.
Roles	Chief Investigator; Indigenous Researcher Fellow; Australian Research Fellow - Indigenous; Mentor; Supervisor
Criteria	Investigator (40%); proposed project content (40%); and quality of research environment and/or mentor and/or supervisor (20%)
Reference	Discovery Indigenous Researchers Development funding rules for funding commencing in 2010

Discovery Projects	
Frequency	One selection round per year
Purpose	To: support excellent fundamental research by individuals and teams; enhance the scale and focus of research in the national research priorities; expand Australia's knowledge base and research capability; encourage research and research training in high-quality research environments; enhance international collaboration in research; and foster the international competitiveness of Australian research.
Features	<ul style="list-style-type: none"> • Discovery Projects supports research projects and fellowships. Fellowships are awarded in four categories: Australian Postdoctoral Fellowships (APDs), Australian Research Fellowships (ARFs), Queen Elizabeth II Fellowships (QEII); and Australian Professorial Fellowships (APFs). • Duration: Research grants may be awarded for one to five years while APDs are awarded funding for three or four years, and ARFs, QEII and APFs for five years. • Size of grant: Research grants may range from \$20 000 to \$500 000 per annum. ARC Fellowships are funded at levels outlined in the funding rules.
Eligibility	Eligible higher education institutions; museums and herbaria. Some fellowships may also be held at research organisations funded by state and territory governments and other Australian Government sources.
Roles	Chief Investigator; Partner Investigator; APD; ARF; QEII; and APF
Criteria	Investigator (40%); and proposed project content (60%)
Reference	Discovery Projects funding rules for funding commencing in 2010
Future Fellowships	
Frequency	One selection round per year (commenced 2009)
Purpose	To: attract and retain outstanding mid-career researchers; build collaboration across industry and/or research institutions and/or disciplines; support research in national priorities across all disciplines that will result in economic, environmental, social, health or cultural benefits for Australia; and strengthen Australia's research capacity by supporting innovative, internationally competitive research.
Features	<ul style="list-style-type: none"> • Duration: Future Fellowships have a standard tenure of four years. • Size of grant: Future Fellowship Level 1 – \$95 000 (plus 28% on-costs); Future Fellowship Level 2 – \$115 000 (plus 28% on-costs); Future Fellowship Level 3 – \$135 000 (plus 28% on-costs). In addition, the ARC will provide Administering Organisations with funding of up to \$50 000 per annum for infrastructure, equipment, travel and relocation costs directly related to the Future Fellow's research. • The ARC collaborates with the National Health and Medical Research Council (NHMRC) and other public research organisations in assessment of funding proposals.
Eligibility	Eligible higher education institutions; AIATSIS; museums and herbaria; research organisations funded by state and territory governments and other Australian Government sources; approved NHMRC Administering Institutions.
Roles	Future Fellow
Criteria	Investigator (50%); project quality (10%); strategic alignment (15%); collaboration (15%); and national research priority (10%)
Reference	Future Fellowships funding rules for funding commencing in 2010

Super Science Fellowships	
Frequency	One call for proposals in 2009–10 for fellowships commencing in July 2010 and July 2011. Proposals for both Round One and Round Two must be submitted within this call.
Purpose	To: attract and retain outstanding early-career researchers; strengthen collaboration in the targeted disciplines across research institutions and organisations; support research in the disciplines of Space science and astronomy, Marine and climate science; and Future industries research-biotechnology and nanotechnology; and strengthen Australia's research capacity by supporting innovative competitive research.
Features	<ul style="list-style-type: none"> • Duration: Super Science Fellowships have a standard tenure of three years. • Size of grant: Super Science Fellowships will be funded at \$72 500 per annum plus 28% on-costs. The Administering Organisation and/or Host Organisation(s) must provide each Super Science Fellow with a minimum of \$20 000 cash for each of the three years of the fellowship, to support the research project.
Eligibility	A proposal may be submitted only by an Eligible Organisation linked to existing Super Science Funding; and/or be involved in an ARC Centres of Excellence, strategic priority of a Publicly Funded Research Agency and/or CRC within one or more of the key theme areas.
Roles	Chief Investigators
Criteria	Project quality (50%); Administering Organisation or Administering/Host Organisation team (30%); and Administering Organisation support and commitment to the proposal (20%)
Reference	Super Science Fellowships funding rules for funding commencing in 2010 and 2011

Table 2: Linkage schemes

Linkage Infrastructure, Equipment and Facilities	
Frequency	One selection round per year
Purpose	To: encourage eligible organisations to develop collaborative arrangements in the higher education sector and with other organisations outside the sector in order to develop research infrastructure; support large-scale cooperative initiatives thereby allowing expensive infrastructure, equipment and facilities to be shared; enhance support for areas of research strength; and ensure that researchers in fields of recognised research potential have access to the support necessary to carry out high-quality research.
Features	<ul style="list-style-type: none"> • Duration: Funding is normally for one year only. However, up to five years of funding can be approved for subscriptions or other payments relating to major international research facilities. • Size of grant: The minimum grant is \$100 000.
Eligibility	Eligible higher education institutions; peak bodies for subscriptions and other payments in respect of international research facilities.
Roles	Chief Investigator; Partner Investigator
Criteria	Investigator(s) (20%); significance of research to be supported with the proposed infrastructure, equipment and facilities (20%); need for excellent Australian researchers to access the proposed infrastructure, equipment and facility (30%); and strength and benefits of collaboration between researchers and/or across Eligible Organisations and/or other eligible organisations (30%)
Reference	Linkage Infrastructure, Equipment and Facilities funding rules for funding commencing in 2009

Linkage Learned Academies Special Projects (LASP)	
Frequency	One selection round per year
Purpose	To: support the development of Australian research. LASP aims to provide Learned Academies and/or the National Academies forum with the flexibility to achieve that objective.
Features	<ul style="list-style-type: none"> • Scope: research programs must encompass research that advances Australian research itself and/or addresses substantive topics (identified in paragraph 5.1.3 of the funding rules). The broad themes under which research proposals are to fall includes national and international collaboration in research. • Call for proposals/duration: proposals are to be called for every three years and research programs will be funded for a three year period. • Funding: funding of \$30 000 (minimum) per year and up to \$120 000 per year (maximum) may be awarded.
Eligibility	Learned Academies; National Academies Forum
Roles	List of researchers
Criteria	As specified in the paragraph 6.1 of the funding rules
Reference	Linkage Learned Academies Special Projects funding rules for funding commencing in 2010
Linkage Projects	
Frequency	Two selection rounds per year
Purpose	To: encourage and develop long-term strategic research alliances between higher education organisations and other organisations, including within industry; support collaborative research on issues of benefit to regional and rural communities; enhance the scale and focus of research in national research priorities; foster opportunities for postdoctoral researchers to pursue internationally competitive research in collaboration with organisations outside the higher education sector; provide outcome-oriented research training to prepare high-calibre postgraduate research students; and produce a national pool of world-class researchers to meet the needs of the broader Australian innovation system.
Features	<ul style="list-style-type: none"> • Duration: Grants are awarded for one to five years. • Size of grant: Grants are for amounts between \$20 000 and \$500 000 per annum. Larger grants may be awarded in special circumstances. • Applicants can seek funding for project costs and the salary of an Australian Postdoctoral Fellowship Industry (APDI) and/or stipend for an Australian Postgraduate Award Industry (APAI). • Linkage Industry Fellowships (LIFs) provide support for the costs involved in a temporary transfer of a researcher from a higher education institution to a partner organisation or vice versa for a period of between three and 12 months. • Proposals must contain a partner contribution, in cash and/or in-kind, which at least matches the amount sought from the Australian Government.
Eligibility	Eligible higher education institutions
Roles	Chief Investigator; Partner Investigator; APDI; LIF
Criteria	<ul style="list-style-type: none"> • Linkage Projects: Investigator (20%); proposed project content (55%); and nature of alliance, commitment from partner organisation and budget (25%). • APDI: excellence of track record relative to opportunities as well as excellence of proposed project.
Reference	Linkage Projects funding rules for funding commencing in 2010

ARC Centres of Excellence	
Frequency	Dependent on available funding.
Purpose	To: undertake highly innovative and potentially transformational research that aims to achieve international standing in the fields of research envisaged and leads to a significant advancement of capabilities and knowledge; link existing Australian research strengths and build critical mass with new capacity for interdisciplinary, collaborative approaches to address the most challenging and significant research problems; develop relationships and build new networks with major national and international centres and research programs to help strengthen research, achieve global competitiveness and gain recognition for Australian research; build Australia's human capacity in a range of research areas by attracting and retaining, from within Australia and abroad, researchers of high international standing as well as the most promising research students; provide high-quality postgraduate and postdoctoral training environments for the next generation of researchers; offer Australian researchers opportunities to work on large-scale problems over longer periods of time; and establish Centres of such repute in the wider community that they will serve as points of interaction among higher education institutions, governments, industry and the private sector generally.
Features	Duration: Up to seven years Size of grant: \$1 to \$4 million per year.
Eligibility	Eligible higher education institutions
Roles	Centre Director; Chief Investigator; Partner Investigator
Criteria	Research program (25%); Investigators (25%); Governance, leadership and mentoring (25%); Outcomes and linkages (25%).
Reference	Centres of Excellence funding rules for funding commencing in 2011
Special Research Initiatives	
Frequency	Various as required
Purpose	To support activities that: encourage greater collaboration among Australian researchers; encourage the development of international research linkages; encourage the cooperative development of high-quality research capacity in emerging areas, and/or enhance the scale and focus of research in priority areas.
Features	<p>Specific to individual initiatives.</p> <p>A selection round for funding under the <i>Research in Bionic Vision Science and Technology</i> initiative was conducted in late 2009. The objective of that initiative was to deliver a program of activities that will support the development of a functional bionic eye in Australia, including:</p> <ul style="list-style-type: none"> - undertaking highly innovative and internationally competitive research through a pioneering and feasible research and development program - undertaking significant collaboration with experts in a broad range of relevant fields, including development of national and international networks and linkages with leading researchers and institutions - developing outcomes with significant health and economic benefit for the Australian community in the short and longer term - providing for potential spin-off innovation, with commercial applications to be pursued through a robust commercialisation strategy - building Australia's human capacity in this area by attracting, from within Australia and overseas, researchers of high international standing as well as the most promising research students. <p>Details of initiatives under which funding commenced in previous years are available on the ARC website.</p>
Eligibility	Eligible Organisations
Roles	Chief Investigator; Partner Investigator
Criteria	Nature and merit of proposal in relation to objectives

ARC SUPPORT FOR INTERNATIONAL RESEARCH COLLABORATION THE NCGP

ACTION	SCHEME
Specific funding initiatives	
International Collaboration Awards (ICAs) of up to \$40 000 are available to enable researchers to travel overseas, or partner investigators living overseas to travel to Australia, to work on their projects for between one and six months. ICAs specifically aim to provide opportunities to build collaborations among researchers, research teams and/or research centres in Australia and overseas.	Discovery Projects
Eligible participants	
Researchers located overseas are able to participate in ARC-funded projects as Partner Investigators without any residency requirements.	Discovery Projects Linkage Projects Linkage Infrastructure, Equipment and Facilities ARC Centres of Excellence
All ARC fellowships and postgraduate awards are open to international candidates as long as they apply through an eligible organisation. The fellow or awardee must obtain temporary or permanent resident status from the Department of Immigration and Citizenship before they commence the fellowships and reside predominately in Australia for the duration of the fellowship or award unless the ARC approves otherwise.	Discovery Projects (Australian Postdoctoral Fellowships, Australian Research Fellowships, Queen Elizabeth II Fellowships, Australian Professorial Fellowships) Linkage Projects (Australian Postgraduate Awards Industry, Australian Postdoctoral Awards Industry, Linkage Industry Fellows) Future Fellowships Australian Laureate Fellowships (funding rules explicitly state that proposals involving Australian or non-Australian researchers are encouraged)
International researchers may participate as Chief Investigators on ARC projects provided they meet the residency status requirements outlined above and reside in Australia for the full term of their participation on a project.	Discovery Projects Linkage Projects Linkage Infrastructure, Equipment and Facilities ARC Centres of Excellence
Overseas organisations (including higher education organisations (or entities closely related to such organisations), companies, and non-profit and government organisations) are eligible to be partner organisations provide they meet the general eligibility criteria for Partner Organisations and additional criteria are addressed to the satisfaction of the ARC. The eligibility of higher education organisations was introduced in 2009.	Linkage Projects
Eligible budget items	
Funding to support the costs of domestic and international travel by Chief Investigators associated with a project	Discovery Projects Linkage Projects ARC Centres of Excellence

ACTION	SCHEME
Funding to support the costs of travel by Partner Investigators (PIs) associated with a project	Discovery Projects (support for PIs living overseas to travel to and from Australia to work on the project to a maximum of once per annum and domestic travel costs for PIs visiting from overseas). Linkage Projects ARC Centres of Excellence
Support for costs associated with Australia's participation in the use of major international research facilities (including consortium membership costs, travel to the research facility, costs associated with establishment or upgrading of the facility, reasonable operational costs and secretariat costs)	Linkage Infrastructure, Equipment and Facilities
Funding to support the cost of domestic and international travel for visitors to the Centre where this is related to the research program or Centre governance.	ARC Centres of Excellence
Funding to support the cost of domestic and international travel for the Fellow, postgraduate researchers, postdoctoral researchers and research support personnel. Funding is permitted for domestic and international travel associated with the project, including fostering and strengthening collaborations between researchers in Australia and overseas.	Australian Laureate Fellows
Funding is permitted for domestic and international travel for the fellow if associated with the project, including fostering and strengthening collaborations between researchers in Australia and overseas.	Future Fellows
Residency requirements	
Approval to undertake research overseas for various periods provided the Administering Organisation clearly demonstrates this is in the best interest of the research and its outcomes and of national benefit to Australia	Australian Laureate Fellows (up to two years) Future Fellows
Scheme objectives	
Inclusion of objectives relating to collaboration (including international collaboration).	[See Attachment A1, Tables 1 and 2]
Scheme selection criteria	
Inclusion of selection criteria relating to international research collaboration	Australian Laureate Fellowships (potential of the research to sustain or enhance international research collaboration – under Project/Program of research activity (30%)) ARC Centre of Excellence (the potential of the Centre to develop and enhance international linkages that will benefit the research, training and knowledge transfer programs – under Outcomes and linkages (25%))

ARC SUPPORT FOR INTERNATIONAL COLLABORATION SELECTED STATISTICS

TABLES AND FIGURES

Notes

- Researchers submitting proposals to the ARC are generally invited to indicate whether they expect to collaborate with researchers in other countries and, if so, to name the countries. These data have been compiled from those indications.
- ‘Formal’ collaborations are defined as those when a person and/or organisation in another country is named in the proposal. ‘Informal’ collaborations are those when no individual or organisations are named as intended collaborators.
- 2009 figures are incomplete because selection processes for some schemes are yet to be finalised.

Tables

Targeted funding initiatives

- 1a** *Discovery Projects* proposals involving International Collaboration Awards (ICAs)
1b Funded ICAs by researchers country address

Instances of international collaboration

- 2a** Number of funded proposals involving collaboration with researchers in other countries, selected schemes, 2002 to 2008
2b Percentage of funded proposals involving international collaboration by ARC scheme, 2002 to 2008
3 Instances of international collaboration in ARC funded proposals by country, 2002 to 2008
4 Instances of international collaboration in funded *Discovery Projects* proposals by country, 2002 to 2008
5 Instances of international collaboration in funded by the *Linkage Projects* proposals by country, 2002 to 2008
6 ARC funded proposals with at least one instance of international collaboration by primary RFCD, 2002 to 2008
7 Number and percentage of funded ARC proposals indicating informal and formal international collaboration, 2002 to 2008
8 Number and percentage of funded *Discovery Projects* proposals indicating informal and formal international collaboration, 2002 to 2008
9 Number and percentage of funded *Linkage Projects* proposals indicating informal and formal international collaboration, 2002 to 2008

Movement of researchers

- 10a** Origin of awardees, all Fellowship schemes most recent rounds
10b Country of awardees, all Fellowship schemes, most recent rounds

Encouraging overseas investment

- 11a** Number and nature of partner organisations (PO), *Linkage Projects* scheme, proposals initially funded 2005 to 2009
- 11b** Partner organisation contributions, *Linkage Projects* scheme by nature of partner organisation, 2005 to 2009

Access to international research infrastructure

- 12** *Linkage Infrastructure, Equipment and Facilities* scheme, support for access to international research facilities

Building scale and focus

- 13** Outputs of ARC-funded centres, collaboration, 2008

Figures

Instances of international collaboration

- 1** Instances of international collaboration in ARC funded proposals by country, 2002 to 2009
- 2** Percentage of funded ARC proposals indicating informal and formal international collaboration¹ over the period, 2002 to 2008
- 3** Percentage of funded *Discovery Projects* proposals indicating informal and formal international collaboration, 2002 to 2008
- 4** Percentage of funded *Linkage Projects* proposals indicating informal and formal international collaboration, 2002 to 2008

SCHEME ABBREVIATIONS

- APDI** Australian Postdoctoral Fellowship Industry
- APD** Australian Postdoctoral Fellowship
- ARF** Australian Research Fellowship
- CE** ARC Centres of Excellence
- DP** Discovery Projects
- FF** Federation Fellowships
- FL** Australian Laureate Fellowship
- FT** Future Fellowships
- LC** Linkage Australian Postdoctoral Fellowships (CSIRO)
- LE** Linkage Infrastructure, Equipment and Facilities
- LP** Linkage Projects
- LX** Linkage International
- RN** ARC Research Networks
- TS** Thinking systems
- SR** Special Research Initiatives

TARGETED FUNDING INITIATIVES

Table 1a: *Discovery Projects* proposals involving International Collaboration Awards (ICAs)

Total number of <i>Discovery Projects</i> proposals	4068
Total number of funded <i>Discovery Projects</i> proposals	925
Overall success rate	22.7%
Number of <i>Discovery Projects</i> proposals submitted requesting one or more ICAs	646
Number of funded <i>Discovery Projects</i> proposals with one or more ICAs	98
Success rate of <i>Discovery Projects</i> proposals with funded ICAs / per submitted proposals requesting one or more ICAs	15.2%
Success rate of <i>Discovery Projects</i> proposals with funded ICAs / per funded proposals	10.6%
Number of ICAs requested	1151
Number of ICAs funded	173
Success rate of ICAs per requested on all proposals	15.0%

Table 1b: Funded ICAs by researcher's country address

Country	ICA count	%
Australia	59	34.1%
USA	38	22.0%
Germany	13	7.5%
UK	13	7.5%
Canada	10	5.8%
France	8	4.6%
China	6	3.5%
Japan	4	2.3%
Hong Kong	3	1.7%
Korea	3	1.7%
Israel	2	1.2%
Netherlands	2	1.2%
Singapore	2	1.2%
Spain	2	1.2%
Belgium	1	0.6%
Finland	1	0.6%
Greece	1	0.6%
India	1	0.6%
Ireland	1	0.6%
Italy	1	0.6%
NZ	1	0.6%
Sweden	1	0.6%
Total	173	100.0%

INSTANCES OF INTERNATIONAL COLLABORATION

Table 2a: Number of proposals involving collaboration with researchers in other countries, selected schemes¹, 2002 to 2008

Proposal submitted	ARC-funded proposals indicating intended collaboration with researchers in at least one other country (no.)	(% of all funded proposals)
2002	792	45.0
2003	917	52.3
2004	925	51.6
2005	810	53.7
2006	809	56.5
2007	768	52.9
2008	922	56.5

¹ Excludes co-funded Centres, *Linkage Learned Academies Special Projects* and some proposals funded under *Special Research Initiatives*.

Table 2b: Percentage of funded proposals involving international collaboration by ARC scheme, 2002 to 2008

Scheme	Submit year						
	2002	2003	2004	2005	2006	2007	2008
FL							100.0%
CE	94.1%		100.0%				
RN			100.0%				
TS				100.0%			
LX	96.5%	100.0%	100.0%	98.7%	100.0%	100.0%	100.0%
FF	97.1%	100.0%	91.7%	88.0%	95.0%	92.9%	
FT							84.0%
SR		92.5%	83.8%				
DP	51.6%	52.9%	56.3%	61.0%	63.6%	58.9%	59.8%
LE	48.7%	61.3%	60.3%	55.4%	58.9%	47.3%	38.4%
LP	22.6%	28.6%	25.6%	26.5%	34.6%	32.7%	37.9%
LC	30.0%						
Total	45.0%	53.2%	51.6%	53.7%	56.5%	52.9%	56.5%

Table 3: Instances of international collaboration in ARC funded proposals by country, 2002 to 2008
 [Ranked by number of incidences. A proposal will be counted more than once if it involves more than one country collaboration.]

Country	2002		2003		2004		2005		2006		2007		2008		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
USA	421	24.7	485	20.9	511	23.1	425	23.7	434	24.5	396	23.8	525	24.8	3197	23.5%
UK	248	14.6	333	14.3	348	15.7	263	14.6	270	15.2	246	14.8	299	14.1	2007	14.8%
Germany	143	8.4	190	8.2	164	7.4	135	7.5	144	8.1	131	7.9	153	7.2	1060	7.8%
Canada	93	5.5	138	5.9	139	6.3	110	6.1	99	5.6	92	5.5	115	5.4	786	5.8%
France	112	6.6	123	5.3	117	5.3	104	5.8	92	5.2	90	5.4	117	5.5	755	5.6%
Japan	95	5.6	138	5.9	113	5.1	86	4.8	95	5.4	65	3.9	82	3.9	674	5.0%
China	47	2.8	84	3.6	76	3.4	59	3.3	71	4.0	68	4.1	101	4.8	506	3.7%
NZ	32	1.9	89	3.8	76	3.4	55	3.1	60	3.4	46	2.8	65	3.1	423	3.1%
Italy	43	2.5	64	2.8	65	2.9	48	2.7	43	2.4	41	2.5	56	2.6	360	2.6%
Netherlands	43	2.5	74	3.2	44	2.0	45	2.5	41	2.3	38	2.3	52	2.5	337	2.5%
Sweden	48	2.8	53	2.3	45	2.0	36	2.0	35	2.0	38	2.3	41	1.9	296	2.2%
Switzerland	30	1.8	43	1.9	34	1.5	21	1.2	43	2.4	40	2.4	44	2.1	255	1.9%
Singapore	19	1.1	40	1.7	32	1.4	31	1.7	17	1.0	30	1.8	31	1.5	200	1.5%
Denmark	17	1.0	32	1.4	32	1.4	20	1.1	23	1.3	19	1.1	20	0.9	163	1.2%
India	24	1.4	18	0.8	20	0.9	23	1.3	19	1.1	25	1.5	34	1.6	163	1.2%
Korea	22	1.3	41	1.8	21	0.9	23	1.3	14	0.8	15	0.9	25	1.2	161	1.2%
Indonesia	15	0.9	29	1.2	29	1.3	23	1.3	15	0.8	18	1.1	18	0.8	147	1.1%
Spain	19	1.1	20	0.9	24	1.1	21	1.2	18	1.0	16	1.0	24	1.1	142	1.0%
South Africa	24	1.4	21	0.9	16	0.7	22	1.2	19	1.1	19	1.1	20	0.9	141	1.0%
Hong Kong	17	1.0	26	1.1	24	1.1	18	1.0	10	0.6	20	1.2	20	0.9	135	1.0%
Other¹	191	11.2	282	12.1	285	12.9	228	12.7	211	11.9	208	12.5	276	13.0	1681	12.4%
Total	1703	100.0	2323	100.0	2215	100.0	1796	100.0	1773	100.0	1661	100.0	2118	100.0	3197	23.5%

¹ "Other" includes at least one instance from the following countries: Afghanistan, Albania, Algeria, American Samoa, Angola, Argentina, Austria, Azerbaijan, Bangladesh, Belgium, Bermuda, Bolivia, Bosnia, Botswana, Brazil, Brunei, Bulgaria, Burkina Faso, Cambodia, Central African Rep., Chile, Colombia, Comoros, Congo, Cook Is., Costa Rica, Croatia, Cuba, Cyprus, Czech Rep., Dominican Rep., East Timor, Ecuador, Egypt, Estonia, Ethiopia, Fiji, Finland, Georgia, Ghana, Greece, Greenland, Guatemala, Hungary, Iceland, Iran, Iraq, Ireland, Israel, Jamaica, Jordan, Kenya, Kiribati, Laos, Latvia, Lebanon, Liberia, Libya, Liechtenstein, Lithuania, Madagascar, Malawi, Malaysia, Maldives, Mauritius, Mexico, Moldova, Monaco, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nepal, New Caledonia, Nigeria, Norway, Oman, Pakistan, Panama, Peru, Philippines, PNG, Poland, Portugal, Puerto Rico, Reunion, Romania, Russia, Rwanda, Saudia Arabia, Seychelles, Sierra Leone, Slovakia, Slovenia, Solomon Is., Sri Lanka, Sudan, Syria, Tahiti, Taiwan, Tanzania, Thailand, Tonga, Trinidad & Tobago, Turkey, Tuvalu, UAE, Uganda, Ukraine, Uzbekistan, Vanuatu, Venezuela, Vietnam, W. Samoa, Yugoslavia, Zaire, Zambia, Zimbabwe.

Figure 1: Instances of international collaboration in ARC funded proposals by country, 2002 to 2008

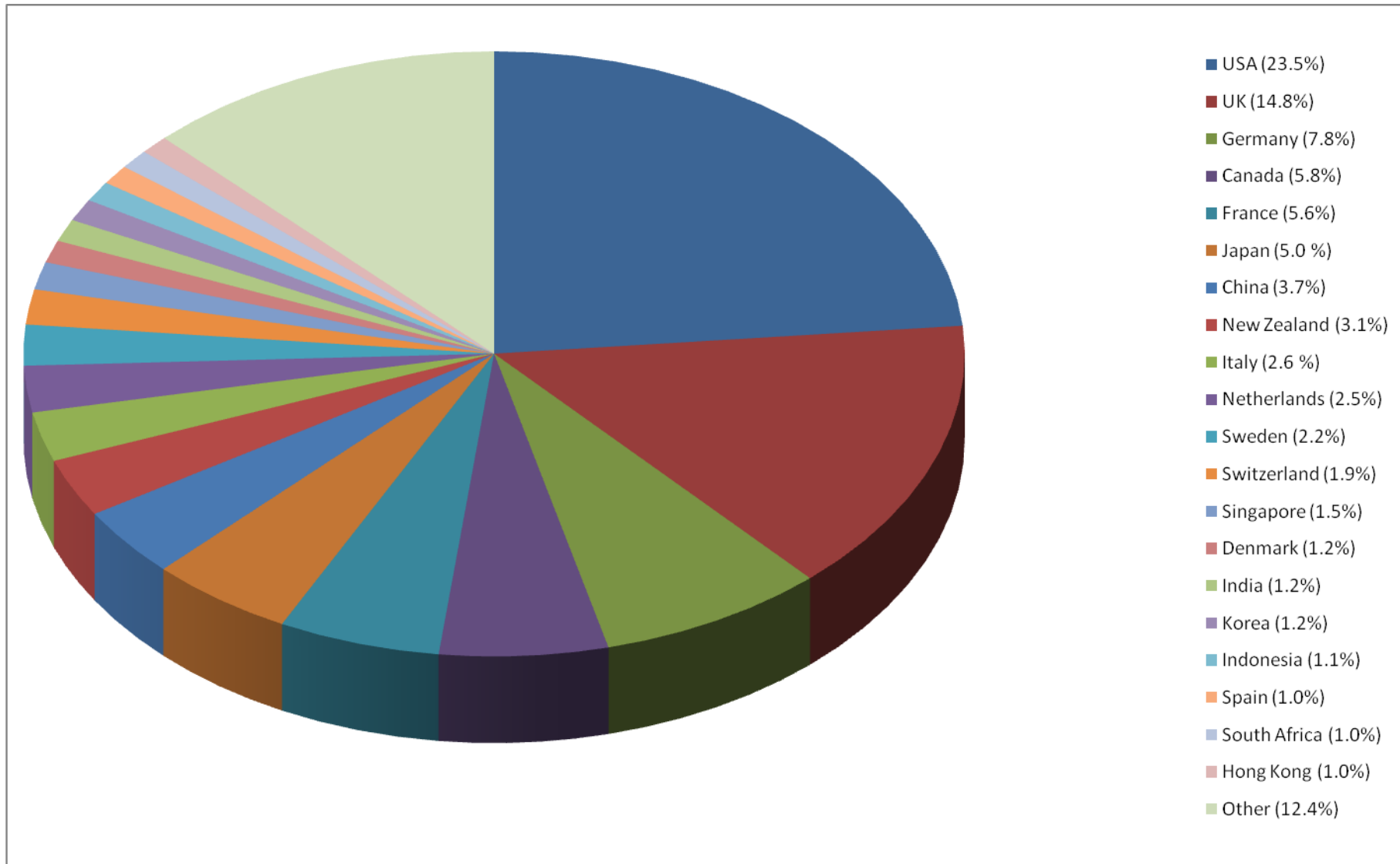


Table 4: Instances of international collaboration in funded *Discovery Projects* proposals by country, 2002 to 2008

[Ranked by number of instances. A proposal will be counted more than once if it involves more than one country collaboration.]

Country	Submit Year							Total
	2002	2003	2004	2005	2006	2007	2008	
USA	280	237	324	306	289	279	281	1996
UK	149	139	211	193	178	170	158	1198
Germany	81	79	98	87	91	86	84	606
Canada	55	46	74	71	72	62	53	433
France	65	48	62	63	64	61	60	423
Japan	56	60	65	62	65	43	48	399
China	27	27	40	43	48	44	52	281
Italy	32	36	45	33	28	30	32	236
NZ	21	35	37	38	40	28	24	223
Netherlands	27	29	23	34	28	27	25	193
Sweden	33	19	25	24	24	23	20	168
Switzerland	20	22	19	13	29	23	29	155
Singapore	10	14	19	19	10	21	14	107
Denmark	8	9	22	14	17	13	14	97
India	17	7	10	18	11	15	17	95
Indonesia	11	12	17	18	11	14	8	91
Hong Kong	14	11	15	14	9	14	13	90
Spain	11	4	18	16	13	14	12	88
South	15	7	6	17	15	13	11	84
Belgium	7	10	11	7	14	11	15	75
Other ¹	116	117	171	173	139	144	146	1006
Total	1055	968	1312	1263	1195	1135	1116	8044

¹ "Other" includes at least one instance from the following countries: Afghanistan, Albania, Algeria, American Samoa, Angola, Argentina, Austria, Azerbaijan, Bangladesh, Bermuda, Bolivia, Bosnia, Brazil, Brunei, Bulgaria, Burkina Faso, Cambodia, Chile, Colombia, Comoros, Cook Is., Costa Rica, Croatia, Cuba, Cyprus, Czech Rep., East Timor, Ecuador, Egypt, Estonia, Ethiopia, Fiji, Finland, Georgia, Ghana, Greece, Greenland, Hungary, Iceland, Iran, Iraq, Ireland, Israel, Jamaica, Jordan, Kenya, Kiribati, Korea, Laos, Latvia, Lebanon, Liberia, Libya, Madagascar, Malaysia, Maldives, Mauritius, Mexico, Moldova, Mongolia, Morocco, Myanmar, Namibia, Nepal, New Caledonia, Nigeria, Norway, Oman, Pakistan, Panama, Peru, Philippines, PNG, Poland, Portugal, Puerto Rico, Romania, Russia, Saudia Arabia, Seychelles, Sierra Leone, Slovakia, Slovenia, Solomon Is., Sri Lanka, Sudan, Syria, Tahiti, Taiwan, Tanzania, Thailand, Tonga, Trinidad & Tobago, Turkey, Tuvalu, UAE, Ukraine, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yugoslavia.

Table 5: Instances of international collaboration in funded *Linkage Projects* proposals by country, 2002 to 2008

[Ranked by number of instances. A proposal will be counted more than once if it involves more than one country collaboration.]

Country	Submit Year							Total
	2002	2003	2004	2005	2006	2007	2008	
USA	58	63	62	42	74	54	69	422
UK	38	40	32	28	40	26	41	245
Canada	14	9	17	12	14	18	20	104
Germany	12	15	13	15	15	15	15	100
France	8	10	8	12	6	11	16	71
NZ	1	9	16	2	8	7	19	62
China	2	11	8	7	6	7	18	59
Japan	8	5	11	6	7	5	7	49
Netherlands	6	10	7	3	3	6	6	41
Sweden	5	10	5	4	3	6	4	37
Switzerland	3	6	5	2	5	7	5	33
Italy		4	4	4	4	3	10	29
India	3	1	5	1	7	5	7	29
Singapore	1	5	4	8	2	3	6	29
South	7	3	2	2	1	3	5	23
Spain	2	6	3	2	2	2	6	23
Indonesia	2	4	4	3	2	3	3	21
Korea		5	3	2	1	2	7	20
Denmark	3	3	4	2	2	2	2	18
Belgium	2	1		1	1	6	2	13
Other ¹	36	42	30	18	23	31	37	217
Total	211	262	243	176	226	222	305	1645

¹ "Other" includes at least one instance from the following countries: Afghanistan, American Samoa, Argentina, Austria, Bangladesh, Brazil, Bulgaria, Cambodia, Chile, Colombia, Croatia, Cuba, Dominican Rep., East Timor, Ecuador, Estonia, Fiji, Finland, Greece, Hong Kong, Hungary, Iceland, Iran, Iraq, Ireland, Israel, Kenya, Laos, Lithuania, Malawi, Malaysia, Mexico, Mozambique, Myanmar, Nepal, New Caledonia, Norway, Pakistan, Peru, Philippines, PNG, Poland, Portugal, Romania, Russia, Rwanda, Solomon Is., Sri Lanka, Syria, Taiwan, Thailand, Tonga, Turkey, Ukraine, Vanuatu, Vietnam, Yugoslavia, Zaire, Zambia.

Table 6: ARC funded proposals with at least one instance of International Collaboration by Primary RFCD, 2002 to 2008

[Number of proposals, ranked by primary Research Fields, Courses and Disciplines (RFCD) classification with the greatest number of proposals involving international collaboration]

Primary RFCD	2002		2003		2004		2005		2006		2007		2008		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Engineering and technology	130	16.4%	163	17.8%	162	17.5%	134	16.5%	129	15.9%	119	15.5%	168	18.2%	1005	16.9%
Biological sciences	106	13.4%	133	14.5%	131	14.2%	104	12.8%	124	15.3%	116	15.1%	154	16.7%	868	14.6%
Physical sciences	97	12.2%	86	9.4%	79	8.5%	80	9.9%	78	9.6%	93	12.1%	77	8.4%	590	9.9%
Chemical sciences	77	9.7%	76	8.3%	83	9.0%	74	9.1%	59	7.3%	53	6.9%	60	6.5%	482	8.1%
Information, computing and communication sciences	61	7.7%	72	7.9%	74	8.0%	43	5.3%	51	6.3%	53	6.9%	60	6.5%	414	7.0%
Earth sciences	60	7.6%	55	6.0%	67	7.2%	56	6.9%	54	6.7%	37	4.8%	41	4.4%	370	6.2%
Mathematical sciences	52	6.6%	47	5.1%	52	5.6%	51	6.3%	41	5.1%	59	7.7%	54	5.9%	356	6.0%
Behavioural and cognitive sciences	38	4.8%	42	4.6%	31	3.4%	43	5.3%	43	5.3%	35	4.6%	32	3.5%	264	4.4%
Medical and health sciences	18	2.3%	25	2.7%	34	3.7%	26	3.2%	24	3.0%	24	3.1%	59	6.4%	210	3.5%
History and archaeology	21	2.7%	27	2.9%	33	3.6%	24	3.0%	40	4.9%	27	3.5%	30	3.3%	202	3.4%
Studies in human society	16	2.0%	42	4.6%	25	2.7%	33	4.1%	26	3.2%	30	3.9%	29	3.1%	201	3.4%
Agricultural, veterinary and	24	3.0%	37	4.0%	18	1.9%	30	3.7%	26	3.2%	17	2.2%	28	3.0%	180	3.0%
Economics	16	2.0%	20	2.2%	28	3.0%	22	2.7%	19	2.3%	21	2.7%	27	2.9%	153	2.6%
Law, justice and law	6	0.8%	15	1.6%	17	1.8%	12	1.5%	14	1.7%	15	2.0%	24	2.6%	103	1.7%
Language and culture	14	1.8%	12	1.3%	22	2.4%	13	1.6%	10	1.2%	18	2.3%	12	1.3%	101	1.7%
Commerce, management,	15	1.9%	17	1.9%	20	2.2%	12	1.5%	18	2.2%	10	1.3%	5	0.5%	97	1.6%
Policy and political science	12	1.5%	13	1.4%	11	1.2%	10	1.2%	11	1.4%	12	1.6%	12	1.3%	81	1.4%
Philosophy and religion	5	0.6%	9	1.0%	12	1.3%	17	2.1%	12	1.5%	7	0.9%	13	1.4%	75	1.3%
Education	13	1.6%	9	1.0%	8	0.9%	8	1.0%	7	0.9%	10	1.3%	18	2.0%	73	1.2%
The arts	10	1.3%	11	1.2%	9	1.0%	8	1.0%	11	1.4%	7	0.9%	8	0.9%	64	1.1%
Architecture, urban environment and building		0.0%	2	0.2%	4	0.4%	7	0.9%	8	1.0%	2	0.3%	8	0.9%	31	0.5%
Journalism, librarianship and curatorial studies	1	0.1%	4	0.4%	5	0.5%	3	0.4%	4	0.5%	3	0.4%	3	0.3%	23	0.4%
Total	792	100.00%	917	100.0%	925	100.0%	810	100.0%	809	100.0%	768	100.0%	922	100.0%	5943	100.0%

Table 7: Number and percentage of ARC funded proposals indicating informal and formal international collaboration, 2002 to 2008

Submit Year	2002		2003		2004		2005		2006		2007		2008		Total	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Formal and informal ¹	325	18%	372	21%	386	22%	360	24%	382	27%	396	27%	386	24%	2607	23%
Informal only ²	475	27%	552	32%	549	31%	462	31%	434	30%	381	26%	543	33%	3396	30%
No collaboration	960	55%	828	47%	858	48%	686	45%	616	43%	675	46%	703	43%	5326	47%
Total number of projects	1760	100%	1752	100%	1793	100%	1508	100%	1432	100%	1452	100%	1632	100%	11329	100%

Table 8: Number and Percentage of funded *Discovery Projects* proposals indicating informal and formal international collaboration, 2002 to 2008

Submit Year	2002		2003		2004		2005		2006		2007		2008		Total	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Formal and informal	168	18%	140	16%	218	21%	218	24%	207	25%	237	27%	222	26%	1410	22%
Informal only	318	34%	324	37%	379	36%	343	37%	317	39%	285	32%	288	34%	2254	36%
None	455	48%	411	47%	458	43%	356	39%	298	36%	356	41%	335	40%	2669	42%
Total Number Project	941	100%	875	100%	1055	100%	917	100%	822	100%	878	100%	845	100%	6333	100%

Table 9: Number and Percentage of funded *Linkage Projects* proposals indicating informal and formal international collaboration, 2002 to 2008

Submit Year	2002		2003		2004		2005		2006		2007		2008		Total	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Formal and informal	60	10%	81	15%	71	15%	65	16%	92	22%	89	22%	127	28%	585	18%
Informal only	77	13%	75	14%	60	12%	50	13%	61	14%	49	12%	48	11%	420	13%
None	450	77%	376	71%	357	73%	285	71%	272	64%	272	66%	282	62%	2294	70%
Total Number Project	588	100%	532	100%	488	100%	400	100%	425	100%	410	100%	457	100%	3300	100%

1 'Formal and informal' collaboration is for funded proposals on which there is at least one named Partner Investigator (eg *Discover Projects*) or Partner Organisation (eg *Linkage Projects*) from overseas nominated. There could be 'informal collaboration' on this type of projects (see Note 2). In most cases, the 'formal' collaboration is also identified as 'informal' collaboration on research proposals. All projects funded under *Linkage International* Scheme are grouped into the category 'Formal and informal' collaboration.

2 'Informal only' collaboration refers to funded proposals that involve at least one overseas country that was nominated by researchers in research proposals to collaborate. There is no name of overseas research investigator or partner organisation in this case.

3 Each funded proposal was counted only once.

Figure 2: Percentage of ARC funded proposals indicating informal and formal international collaboration, 2002 to 2008

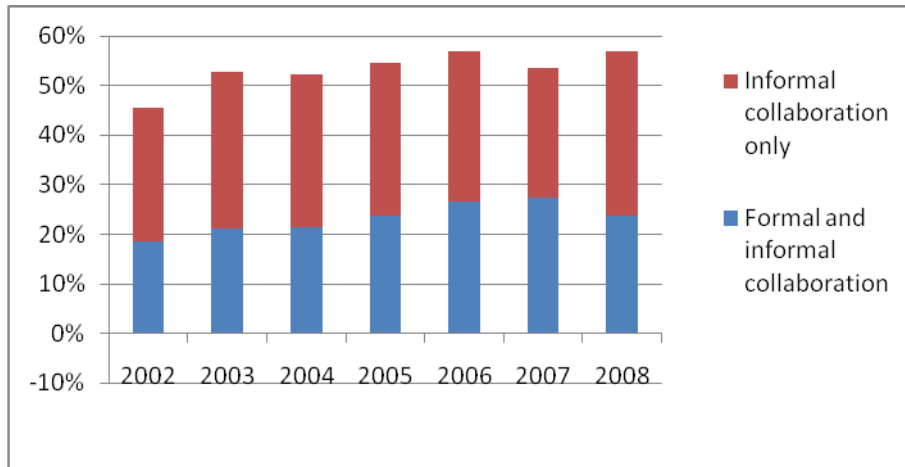


Figure 3: Percentage of funded *Discovery Projects* proposals indicating informal and formal international collaboration, Submit Year 2002 to 2008

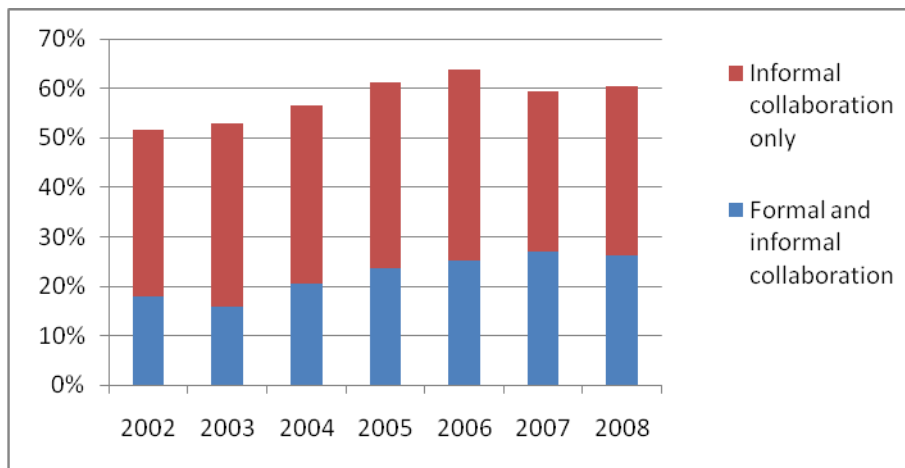
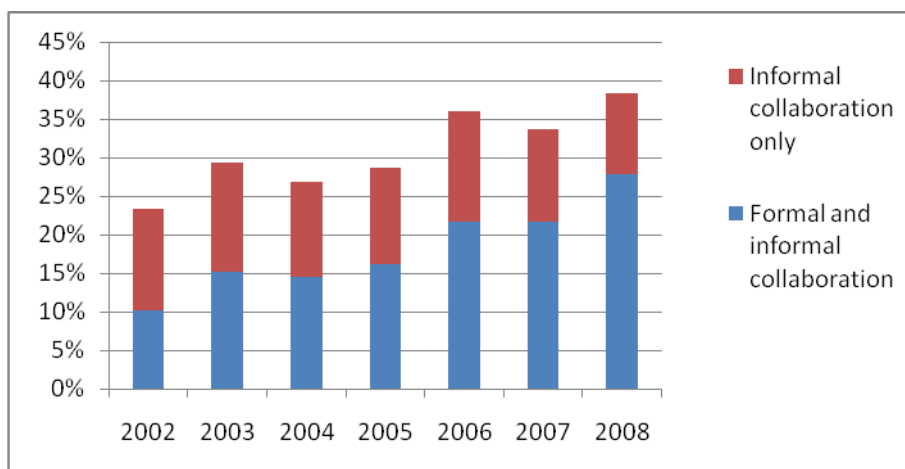


Figure 4: Percentage of funded *Linkage Projects* proposals indicating informal and formal international collaboration, Submit Year 2002 to 2008



MOVEMENT OF RESEARCHERS

Table 10a: Origin of awardees, all Fellowship schemes, most recent rounds

Citizenship/residency status ¹	Funded fellowships		Funded fellowships			
	No.	%	No.	%	No.	%
Funding commencing in 2009						
Schemes	FL09		FT09		APDI (LP09)	
Resident Australians	12	80.0%	159	79.5%	23	74.2%
Returning Australians	2	13.3%	19	9.5%	0	0.0%
Foreign Nationals	1	6.7%	22	11.0%	8	25.8%
Total	15	100.0%	200	100.0%	31	100.0%
Funding commencing in 2010						
Schemes	APD(DP2010)		ARF/QEII		APF	
Resident Australians	67	59.8%	53	82.8%	23	85.2%
Returning Australians	9	8.0%	2	3.1%	1	3.7%
Foreign Nationals	36	32.1%	9	14.1%	3	11.1%
Total	112	100.0%	64	100.0%	27	100.0%

¹ Fellows are categorised according to information provided in proposal:

- 'Resident Australians' are researchers who indicated they are Australian citizens or have obtained permanent residency status and are residing in Australia at time of proposal submission.
- 'Returning Australians' are researchers who indicated they are Australian citizens or have obtained permanent residency status and are residing outside of Australia at time of proposal submission.
- 'Foreign Nationals' are researchers who indicated they are not Australian citizens and did not have permanent residency status at time of proposal submission.

Table 10b: Country of awardees, all Fellowship schemes, most recent rounds

Foreign Nationals - Researcher country of citizenship	Funding commencing in 2009			Funding commencing in 2010			Total
	FL09	FT09	APDI (LP09 R1&R2)	APD (DP10)	ARF (DP10)	APF (DP10)	
China		6		7	1		14
Germany		5	1	3	1	1	11
Canada		1		6	2		9
UK	1	3	2	1	1		8
USA		4		2		1	7
Japan			1	4			5
France				3			3
India		1		2			3
Argentina			1	1			2
Netherlands		1		1			2
Algeria				1			1
Austria					1		1
Brazil			1				1
Chile					1		1
Hong Kong				1			1
Indonesia		1					1
Italy			1				1
Korea				1			1
NZ					1		1
Singapore			1				1
Slovakia				1			1
South Africa					1		1
Spain				1			1
Sweden						1	1
Thailand				1			1
Total	1	22	8	36	9	3	79

ENCOURAGING OVERSEAS INVESTMENT

Table 11a: Number and nature of partner organisations (PO), *Linkage Projects* scheme, 2004 to 2008

Type of PO	Submit year				
	2004	2005	2006	2007	2008
Company					
Australian (no.)	234	232	251	237	291
International (no.)	77	77	93	74	96
Total (no.)	311	309	344	311	387
Total (%)	34.7	40.4	40.0	38.7	38.2
Government					
Commonwealth (no.)	63	43	64	52	51
State and local (no.)	331	257	309	273	346
International (no.)	16	19	15	13	17
Total (no.)	410	319	388	338	414
Total (%)	45.8	41.8	45.1	42.0	40.9
Non-profit					
Australian (no.)	164	129	118	136	179
International (no.)	10	7	11	19	32
Total (no.)	174	136	129	155	211
Total (%)	19.4	17.8	15.0	19.3	20.8
Total					
Total (no.)	895	764	861	804	1012
Total grants (no.)	488	400	425	410	456
Total PO/grant (ratio)	1.8	1.9	2.0	2.0	2.2

1 All states and territories of Australia.

2 Total count of organisations, that is, including multiple counts of the same organisation

Table 11b: Partner organisation contributions¹, *Linkage Projects* scheme by nature of partner organisation, 2005 to 2008

Sector	Submit year							
	2005		2006		2007		2008	
	Cash (\$m)	Total ² (\$m)	Cash (\$m)	Total ² (\$m)	Cash (\$m)	Total ² (\$m)	Cash (\$m)	Total ² (\$m)
Company								
Australian	21.5	66.6	25.6	81.2	25.7	79.6	28.5	81.9
International	15.5	33.3	13.3	37.5	9.3	31.8	11.4	37.4
Government								
Australian	3.2	7.3	7.6	15.9	3.7	10.3	4.4	10.1
State and local	13.0	41.1	15.9	59.8	17.7	59.5	25.1	82.6
International	0.7	4.3	1.2	4.4	0.5	1.8	1.5	4.6
Non-profit								
Australian	4.6	19.4	5.6	17.8	6.4	22.8	9.4	33.0
International	1.9	3.3	0.6	3.1	1.2	4.4	1.3	6.0
Total	60.4	175.3	69.8	219.7	64.6	210.2	81.5	255.7
PO /ARC (ratio)	0.55	1.59	0.58	1.83	0.51	1.69	0.57	1.79

1 Cash and in-kind contributions pledged by partner organisations over the lives of projects. Where requests are not fully funded by the ARC, partner contributions may sometimes be reduced.

ACCESS TO INTERNATIONAL RESEARCH INFRASTRUCTURE

Table 12: Linkage Infrastructure, Equipment and Facilities; support for access to international research facilities

Year	Integrated Ocean Drilling Project	International Gemini Partnership	Australian High Energy Physics Program	Mileura International Radio Array (MIRA) Wide Field Array	Advanced Synchrotron Radiation Facility	Advanced Laser Interferometer Gravitational-Wave Observatory (LIGO) Project	ISIS Neutron Spallation Source
2003	\$1,363,123 ¹	\$1,855,121	\$ 247,000	-	-	-	-
2004	-	\$1,849,438	\$ 257,250	-	-	-	-
2005	-	\$1,458,000	\$ 361,693	-	-	-	-
2006	-	\$1,462,325	\$ 295,000	-	-	-	-
2007	-	\$1,521,200	\$ 270,000	-	-	-	-
2008	\$1,200,000	\$ 900,000	\$ 270,000	\$ 750,000	-	-	\$200,000
2009	\$1,200,000 ²	\$ 900,000	\$ 270,000	\$ 680,000	\$180,000	\$ 400,000	\$200,000
2010	\$1,200,000 ²	\$ 900,000	\$ 270,000	-	\$180,000	\$ 500,000	\$200,000
2011	\$1,200,000 ²	-	\$ 270,000	-	-	\$ 500,000	\$200,000
2012	\$1,200,000 ²	-	-	-	-	\$ 400,000	\$200,000

¹ Funding of the IODP under an earlier grant ended in 2003. The IODP funding commencing 2008 is made under a new grant.

² Funding for IODP 2009-2012 was increased to \$1,550,000 per annum starting October 2009.
 - Funding figures are at time of announcement in Australian dollars.
 - Funding for 2011 and 2012 is subject to Ministerial approval under the ARC Act.

BUILDING SCALE AND FOCUS

Table 13: Outputs of ARC-funded centres, collaboration, 2008

Type of output	Type of centre ¹			
	CE03	CE05	CE07	SRC
	Average per centre (no.)	Average per centre (no.)	Average per centre (no.)	Average per centre (no.)
National collaborating institutions	15	10	14	20
International collaborating institutions	37	40	10	47
Countries involved in collaboration	13	13	7	14
International visitors to centres	33	39	21	27
Countries from which international visitors originated	11	13	8	10
Overseas visits by centre	57	46	31	36
Countries visited by centre	15	15	12	13
Number of centres	14	11	1	9

¹ CE03 (2003 ARC Centres of Excellence and ARC Centres); CE05 (2005 ARC Centres of Excellence); CE07 (ARC Centre of Excellence for Policing and Security, established in 2007 under the *Special Research Initiatives* scheme; SRC (Special Research Centres)

IMPACT OF ARC-FUNDED RESEARCH – INTERNATIONAL COLLABORATION FINDINGS

Overview

In order to measure the impact of research it funds, the ARC commissioned a study⁵ to assess the performance of publications attributable to ARC-funded research in attracting citations in the wider international research literature, to compare that performance with the impact of publications emanating from elsewhere within the Australian research system, and to benchmark it against world performance.

Summary findings

- Publications linked to funding from the ARC had grown by 41 per cent since the last study covering 1996–2000. This is more than twice the total Australian and world growth.
- The relative citation impact for both ARC-funded research and Australian research as a whole is above the world average. The relative citation impact of ARC-funded output remains unchanged between the two periods and the differential between ARC-funded output and the Australian total is narrowing.

Findings about international collaboration

[see Figure 1]

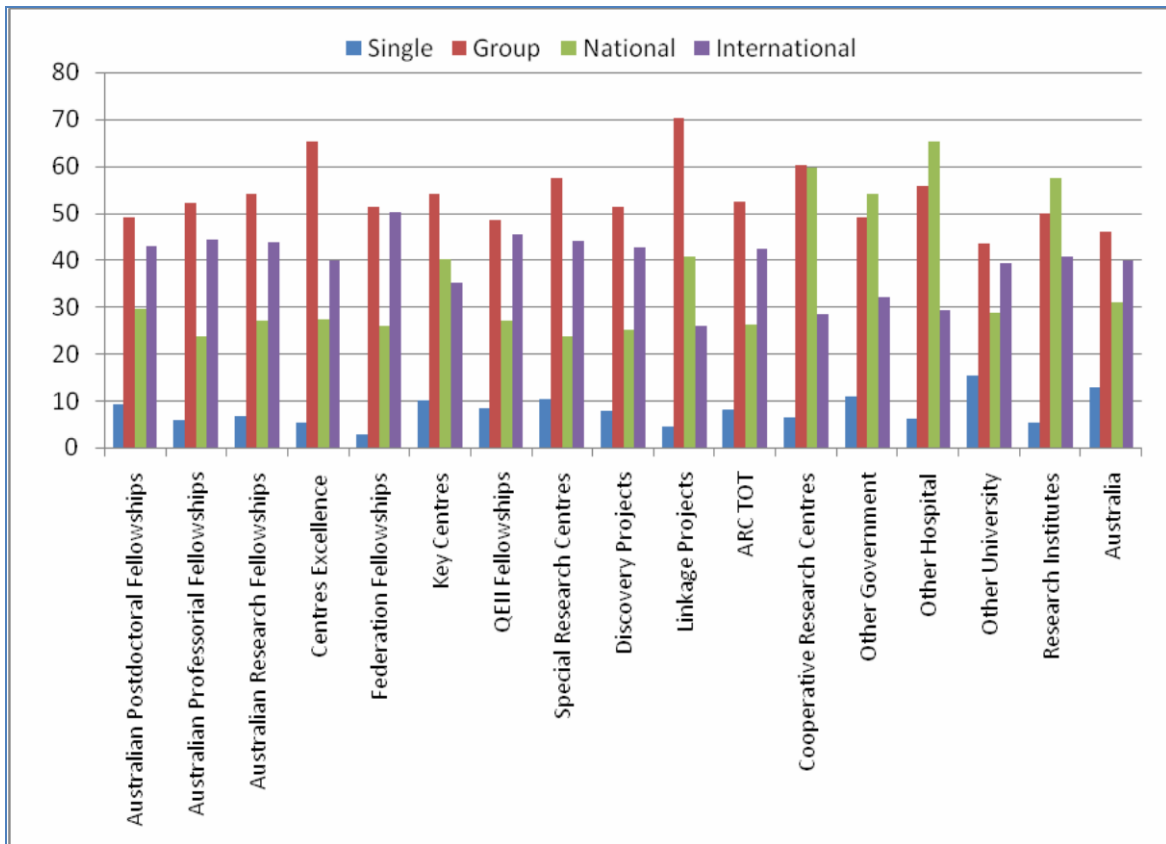
- Collaboration is stronger internationally than nationally and multiple authorship from within the same institute predominates. The level of international collaboration has risen across all sectors since the previous study, reflecting world-wide trends and now stands at 40 per cent for all Australian output and slightly above this for ARC in total.
- The *Linkage Projects* scheme has much higher levels of national collaboration than other ARC schemes. They also have relative low levels of single authorship and international collaboration. Close to half the publications from the *Federation Fellowships* sector involve international collaboration, the highest for any sector and they also have the lowest levels of single authorship. This form of co-authorship is lower in the Cooperative Research Centres, other hospital and other government sectors.

[see Table 5]

- Over recent years, the focus of Australia's scientific collaborations has turned more to continental Europe, with a decreasing emphasis on the USA and the UK as partners in research. The ARC schemes appear to adhere to this pattern. The main difference between the direction of ARC international collaborations and that for most comparator sectors is stronger links to Germany and Japan and slightly weaker links to the USA, England and New Zealand. Federation Fellows have particularly strong links to China and Germany and the Queen Elizabeth II fellows to China. Key Centres have stronger than average links to Germany, Japan and France.

⁵ Bev Biglia and Linda Butler, *ARC-supported research: the impact of its journal publications 2001-2005*, The Australian National University, October 2009

Figure 1. Collaboration patterns by scheme/sector⁶



⁶ Bev Biglia and Linda Butler, *ARC-supported research: the impact of its journal publications 2001-2005*, The Australian National University, October 2009, page 10

Table 5. International collaboration by scheme/sector and country (percentage distribution)⁷

COUNTRY	ARC Schemes											Comparator Sectors				
	APD	APF	ARF	CE	Disc	FF	KC	Link	QEII	SR C	ARC Tot	CRC	Oth govt	Oth hosp	Oth univ	Res Inst
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
USA	34	36	27	32	35	35	27	35	31	39	35	36	38	37	33	45
ENGLAND	20	13	15	14	15	16	11	11	21	15	15	12	21	28	18	17
GERMANY	12	10	12	10	10	16	21	11	9	13	11	8	8	11	9	10
PEOPLES R CHINA	9	11	11	9	10	21	8	8	15	8	10	6	5	5	8	5
JAPAN	10	7	6	4	7	5	13	8	9	7	7	7	7	4	6	8
CANADA	7	4	5	8	6	7	7	7	5	11	7	7	10	13	8	7
FRANCE	8	7	6	5	7	3	11	4	4	5	6	8	7	8	5	8
SWEDEN	4	5	3	3	4	5	1	4	5	3	4	2	2	4	3	4
ITALY	4	5	6	3	4	4	3	1	3	3	4	3	3	8	4	3
NEW ZEALAND	4	4	4	3	3	1	9	7	2	2	3	7	11	7	6	6
NETHERLANDS	3	3	2	1	3	5	5	5	2	1	3	3	4	7	4	5
RUSSIA	2	3	4	0	3	2	4	1	2	3	3	1	1	0	2	1
SCOTLAND	3	2	1	1	2	2	0	3	3	2	2	2	5	5	3	2
SINGAPORE	2	3	1	3	2	2	6	1	3	1	2	1	1	2	3	1
SWITZERLAND	2	2	2	2	2	1	4	3	3	3	2	2	3	6	3	3
SPAIN	3	3	2	3	2	3	1	2	1	1	2	2	2	4	2	2
SOUTH KOREA	2	3	1	0	2	1	0	3	3	1	2	1	1	0	2	1
DENMARK	2	1	2	1	2	0	0	3	2	1	2	1	2	3	2	2
TAIWAN	1	1	1	2	1	2	2	1	5	1	1	0	1	1	1	0
INDIA	2	1	2	1	1	2	0	0	1	0	1	2	2	1	2	2
ISRAEL	1	1	2	3	1	2	0	1	0	3	1	0	1	2	1	1
POLAND	2	2	1	0	2	0	1	1	1	0	1	0	0	1	1	0
SOUTH AFRICA	1	1	0	0	1	0	6	1	0	0	1	2	3	2	2	1
BRAZIL	2	1	4	3	1	0	1	0	1	2	1	1	1	2	1	1
BELGIUM	1	2	2	0	1	1	0	0	2	0	1	2	1	5	2	2
WALES	3	1	0	0	1	1	1	1	1	1	1	0	1	1	1	1
AUSTRIA	0	1	1	1	1	0	1	0	1	1	1	1	2	4	2	1
IRELAND	1	1	1	4	0	1	1	0	0	1	1	1	1	2	1	0
NORWAY	1	0	1	0	0	0	1	1	2	1	1	2	1	2	1	1
CHILE	1	1	0	1	0	3	1	0	0	0	1	0	1	0	1	0
FINLAND	1	1	0	1	1	0	0	0	0	0	1	1	1	2	1	2
THAILAND	0	0	1	0	0	1	2	1	0	0	0	1	2	1	1	1
MEXICO	0	1	1	0	0	0	1	0	0	0	0	1	1	0	0	1
ARGENTINA	0	0	0	1	0	1	1	0	1	1	0	1	1	1	0	1
CZECH REPUBLIC	1	0	1	0	0	0	1	0	0	0	0	0	0	1	1	0
HUNGARY	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1
INDONESIA	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
IRAN	0	1	0	1	0	1	0	1	0	0	0	0	0	0	1	0
UKRAINE	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Australia (no. pubs)	696	965	451	229	4503	491	141	416	526	821	7321	922	2646	3495	23073	5774

*This table only includes countries with 25 or more international collaborations for ARC total.

⁷ Bev Biglia and Linda Butler, *ARC-supported research: the impact of its journal publications 2001-2005*, The Australian National University, October 2009, pages 10-11

OVERSEAS RESEARCH AGENCIES

International research strategies

ORGANISATION / DOCUMENT	STRATEGIC AIMS / GOALS
UNITED KINGDOM	
Research Councils UK: International research – A strategy for the UK Research Councils	<ol style="list-style-type: none"> 1. Encourage collaboration between UK researchers and the best researchers from around the world 2. Promote the movement of researchers to and from the UK 3. Give UK researchers access to data, facilities and resources 4. Influence the international research agenda 5. Promote the UK as a world centre for research and innovation
UK Arts and Humanities Research Council (AHRC): AHRC International Research Strategy 2009–12	<ol style="list-style-type: none"> 1. Add value to our research by encouraging collaboration between UK researchers and the best researchers around the world 2. Promote the movement of researchers to and from the UK 3. Facilitate access to other funding sources, facilities and resources 4. Influence the international research agenda 5. Promote the UK as a world centre for research and innovation
UK Biotechnology and Biological Sciences Research Council (BBSRC): International strategy (2007)	<p>To ensure that the UK remains a world-leader in the biosciences, and that academic research, industrial R&D and the UK economy benefit from the increasing scientific activity across the globe. Through four interrelated areas of activity:</p> <ol style="list-style-type: none"> 1. Promoting movement of people 2. Enabling international research and collaboration 3. Ensuring access to world-class infrastructure and information 4. Discharging its global responsibilities
UK Economic and Social Research Council (ESRC)	<ol style="list-style-type: none"> 1. Remove barriers to transnational research collaborations 2. Provide tools, training and access to enable UK social scientists to tackle global issues 3. Encourage UK social scientists to engage with international funding opportunities 4. Engage with international agencies where this can bring benefits to UK social science 5. Benchmark the quality of UK social science internationally
UK Engineering and Physical Sciences Research Council (EPSRC): International strategy	<p>Aims:</p> <p>Our strategy is to maintain the UK’s position for high-quality research and training, and to provide opportunities for researchers to collaborate internationally. We see our role as enabling good international collaboration by providing funding for UK researchers to work with the collaborators they have chosen.</p> <p>Using our comprehensive knowledge of UK research, we want to make sure that the best UK research organisations are working with the best organisations from the rest of the world. We will work with other organisations to help researchers to get maximum value from international organisations and opportunities</p>

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<p>UK Engineering and Physical Sciences Research Council (EPSRC): International strategy (<i>continued</i>)</p>	<p>Five actions:</p> <ul style="list-style-type: none"> • Provide funding for UK researchers to collaborate internationally with their chosen partners. • Help UK researchers to do well from European Union programmes. The Framework Programme has many opportunities and we, together with other organisations, can provide help and support to ensure that UK research is well connected into the European Research Area (ERA). • Work closely with other UK organisations involved in international research, including Research Councils UK, the Foreign and Commonwealth Office, Office of Science and Innovation, British Council, Royal Society and the UK Research Office in Brussels. • Be well-informed about international science policy developments to make sure that our decisions are informed by current international thinking. • Involve the international research community in EPSRC activities, particularly through international reviews of EPSRC programmes and involvement of overseas researchers, especially from target countries, in peer review.
<p>UK Medical Research Council (MRC)</p>	<p>The MRC's international strategy is to maximise the value of the research we fund in the UK and overseas, by promoting international collaboration and providing scientific and political leadership.</p>
<p>Natural Environment Research Council (NERC): An International Plan for NERC</p>	<p>The NERC strategy (<i>Next Generation Science for Planet Earth (2007-2012)</i>) sets out NERC's ambition to deliver world leading environmental research at the frontiers of knowledge, confirms NERC's commitment to UK leadership in environmental sciences and commits NERC to working internationally to find solutions to global problems.</p> <p>'To deliver its strategy NERC will:</p> <ul style="list-style-type: none"> (i) support UK leadership and participation in international partnerships and programmes (ii) promote international collaboration across the breadth of its own investments (iii) encourage UK scientists to work with the best in the world and to establish international networks especially at early stages in their careers (iv) fund world-class scientists to work in the UK and will exceptionally fund overseas scientists to work with the UK where there is a unique benefit to NERC (v) strategically target partners and research topics that will provide a foundation for UK collaboration and leadership to 2012 and beyond'.
UNITED STATES OF AMERICA	
<p>US National Science Foundation (NSF)</p>	<p>NSF's Office of International Science and Engineering (OISE) 'seeks to ensure that U.S. institutions and researchers are globally engaged, are able to advance their research through international collaboration, and will maintain U.S. leadership within the global scientific community'. 'OISE's portfolio of activities employs three approaches:</p> <ol style="list-style-type: none"> 1. supporting planning visits and workshops that are expected to lead to international collaborative projects (Planning Visits and Workshops); 2. providing international research opportunities for U.S. students and early-career scientists and engineers (Global Scientists and Engineers); and 3. funding international partnerships with larger, longer-term awards in which research and educational activities build on institutional strengths. These partnerships expand global networks to create lasting international linkages with foreign institutions, leverage international investments and provide collaborative experiences involving U.S. researchers at all career levels (Partnerships for International Research and Education).'

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CANADA	
<p>Natural Sciences and Engineering Research Council of Canada (NSERC): NSERC International Strategy</p>	<p>To achieve its international vision, NSERC will increase the excellence, visibility and impact of Canadian NSE research and talent within the global research community by:</p> <ul style="list-style-type: none"> - Working to attract the best foreign students, researchers and companies to conduct research in Canada and in partnership with Canadians; and - Promoting the leadership and contribution of Canadian scientists and engineers to address priorities and challenges for Canada and the international community. <p>NSERC's international strategy aims to:</p> <ul style="list-style-type: none"> - leverage Canada's investment in research, infrastructure and training; - access a broader pool of talent, scientific expertise and technical skills; - create a destination of choice for the training of foreign research talent; - raise the profile of Canadian university-based research; - facilitate the pooling of knowledge, resources and expertise to address complex global issues; and - attract technology-based investments to Canada.
<p>Social Sciences and Humanities Research Council of Canada (SSHRC): SSHRC's International Policy and Strategy 2009</p>	<p>To enhance research excellence through International collaborative research and the internationalization of research training.</p> <p>Key commitments:</p> <ol style="list-style-type: none"> 1. To provide opportunities for new and established Canadian researchers to lead and contribute to international collaborative activities 2. To promote Canada's leadership in, and the contribution of Canadian social sciences and humanities research to, major global issues and international research agendas 3. To increase opportunities for research trainees to study and conduct research in an international context
EUROPE	
<p>Academy of Finland: International strategy 2007-15</p>	<p><u>Priorities</u></p> <ul style="list-style-type: none"> ● collaboration with foreign funding bodies to further develop peer review processes ● initiatives to increase the attractiveness of Finnish research environments to international researchers ● internationalisation of research programs and participation in ERA-NETS that benefit Finnish research. (ERA-NETS is a scheme coordinated under the European Union's Seventh Framework Program that aims to further European research cooperation). ● and initiatives to support the international mobility of researchers.

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<p>Netherlands Organisation for Scientific Research: Science Valued! NWO Strategy 2007-2010</p>	<p>Ambition: For the Dutch research system to attach a leading position in Europe within ten years.</p> <p>Lines of action</p> <ol style="list-style-type: none"> 1. Opportunities for researchers 2. Consolidating strengths 3. Science for society <p>Relevant instruments</p> <ul style="list-style-type: none"> • (1) A brain-gain grant to bring world class researchers to stay in The Netherlands on a long-term basis • (1) Open up all human resources programs to foreign researchers under the condition that the research is conducted at an institution in the Netherlands. By means of an offensive information policy these human resources programmes will be brought to attention internationally. • (2) Developing a funding programme for large scale research facilities in cooperation with SenterNovem (A Dutch government agency that has now been merged into the NL Agency, which is responsible for implementing innovation, environment and sustainability policy). The objective is to invest in the development and utilisation of research facilities of international significance • (2) Developing national road maps for large scale research facilities in close interaction with all relevant partners and linked to international initiatives in this area • (2) Contributing to strengthening European research cooperation, in particular via active contributions to EUROCORES (European Collaborative Research scheme coordinated by the European Science Foundation), ERA-NETs and Technology Platforms • (2) Intensifying the cooperation with European partner organisations • (2) Selectively investing means for the development of scientific collaboration with a limited number of rising economies such as China and India • (2) Contributing to the Millenium Development Goals of the United Nations.
<p>Netherlands Organisation for Scientific Research: NWO Strategy Memorandum 2011-2014 (not yet released)</p>	<p>Aims: Key aspects of discussion memorandum for the new NWO Strategy 2011-2014 relevant to the NWO's international strategy include</p> <ul style="list-style-type: none"> • Maintain talent policy, with a focus on target groups, mobility and career progression • Strengthen international cooperation in Europe and with emerging science countries • Forum function: a systematic and permanent interaction with the scientific world

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NEW ZEALAND	
<p>New Zealand Ministry of Research Science and Technology (MORST):</p> <p>Making the connection – MoRST’s International Linkages Strategy 2005–2007</p>	<p>Mission: To benefit New Zealand by fostering stronger connections between our research community and the rest of the world</p> <p>Aims</p> <ol style="list-style-type: none"> 1. Facilitate connections between New Zealand science and technology researchers and their international colleagues that result in increased levels of R&D co-investment, innovation, technology transfer and capability enhancement. 2. Improve cooperation and coordination among different Government agencies regarding the promotion of New Zealand’s RS&T sector overseas 3. Ensure we effectively meet our obligations in multilateral forums such as APEC and OECD. <p>Note: MORST’s Statement of Intent 2009 identifies one of four core business objectives as to ‘strengthen New Zealand’s international RS&T links’. Annual components supporting this objective were:</p> <ul style="list-style-type: none"> ● Streamline and simplify grants supporting early stage international research collaboration and align these more effectively with other funding instruments ● Consolidate the RS&T bilateral relationships in North Asia ● Enhance international relationships in the areas of renewable energy research and development, to help support New Zealand’s energy security and economic development.
CHINA	
<p>National Natural Science Foundation of China (NSFC):</p> <p>International (Regional) Cooperation and Exchange</p>	<p>Priority tasks in 2009:</p> <ul style="list-style-type: none"> ● continue to strengthen the organisation and implementation of substantial joint research projects and facilitate researchers to make full use of global scientific and research resources ● give full play to the key role of bi/multilateral cooperative agreements, consolidate strategic cooperation with overseas funding organisations, and plan and organize substantial joint research projects at higher levels ● Adopt the management of excellence approach, further improve the management regulation, standardize examination and approval procedures and strictly implement the budgeting system, so as to raise the managerial and funding efficiency and create a favourable environment for researchers to conduct international (regional) collaboration and exchange ● Continue to perfect funding of international (regional) cooperation, major international (regional cooperation and international conferences (including conferences and workshops within the agreement framework of NSFC and its partner funding agencies.