Monitoring report on the participation of EU researchers and institutes in Australian programmes

[Deliverable 1.3, AUS-ACCESS4EU project no. 244485]

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November 2010

Project funded under EU FP7, Capacities Programme, International Cooperation

Project number: FP7-244485

Project duration: October 2009 - September 2011

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Document Status

AUS-ACCESS4EU - Supporting EU Access to Australian Research Programmes

Deliverable title	**D1.3 Monitoring report on the participation of EU researchers and institutes in Australian programmes**
Deliverable lead	ANU/CSIRO
Related WP	WP1 Inventory and monitoring
Related task	Task 1.3 Monitoring the participation of EU researchers and institutes in Australian programmes
Author(s)	Mr Paul Harris, Dr Merrilyn Fitzpatrick, Kerrie Glennie
Dissemination level	**PU** = Public
Due submission date	March 2010
Actual submission date	December 2010
Project number	244485
Instrument	Coordination and Support Action (CSA)
Start date of project	01/10/2009
Duration	24 months

Administrative Abstract	This paper provides an overview of available data on the participation of European Union (EU) researchers and institutions in Australian research and innovation funding programmes. It analyses the data provided by a range of key Australian programmes, identifies issues and makes recommendations relevant to making future improvements to data collection and analysis.

Project funded by the European Commission under the International cooperation activity of the Capacities Programme of the 7th European Framework Programme for RTD.

Versioning and contribution history

Version	Date	Modification reason	Modified by
v01	29-11-10	Not applicable (First Draft)	Not applicable (First Draft)
v02	6-12-2010	Updated data from programme owners	Merrilyn Fitzpatrick, Paul Harris
v03	16-12-2010	Further updated data from programme owners	Merrilyn Fitzpatrick, Paul Harris
V04	19-01-2011	commented	Thomas Reineke
v.5	7-07-2011	Revised according to comments	Merrilyn Fitzpatrick, Paul Harris, Kerrie Glennie, Rado Faletic.

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Executive Summary

This paper provides an overview of available data on the participation of European Union (EU) researchers and institutions in major Australian research programmes. This is intended to provide an indicative baseline for future development through the AUS-ACCESS4EU project and by Australian programme owners themselves. The goal of this work is to assist in the improving of data collection about international research collaboration and to inform decisions by individual researchers, institutions and governments. Of particular interest to this project is the level of existing collaboration between EU and Australian researchers, and more specifically, the extent to which European researchers are accessing Australian programme funding to support this participation. While the data provides evidence of substantial and increasing collaboration between EU and Australian researchers, the inconsistency of collection of data across funding programmes limits the capacity to produce an accurate picture and suggests it could be worthwhile for programme owners to enable increased analysis of their levels of international collaboration. This paper analyses information on a range of key Australian programmes and institutions before concluding with an identification of issues relevant to making future improvements to data collection and analysis.

Preamble

This paper has been prepared as part of a set of interconnected projects which aim to enhance international research collaboration by raising awareness amongst European-based researchers of the funding opportunities that support collaboration with colleagues in a range of non-European nations. Projects with this focus, funded by the European Commission, are now underway in Australia, Brazil, Canada, China, India, Mexico, New Zealand, Russia, South Africa, South Korea, and the USA. These projects target both research and innovation support programmes. They are known collectively as ACCESS4EU projects.[2]

These moves to develop a more coordinated relationship between the European Union and a range of non-EU countries may also point the way towards more effective multilateral coordination over these matters in the future.

The Australian project is led by the *International Bureau of the German Federal Ministry of Education and Research* and also involves the *Forum for European-Australian Science and Technology cooperation* (FEAST), the *Commonwealth Scientific and Industrial Research Organisation* (CSIRO) and *The British Council*.

The various national projects are cooperating over the development of a standard database architecture that aims to make it easier to understand and compare different nations' research funding arrangements. The projects are also collecting and disseminating data on:

- access opportunities for European researchers in each country;
- the distinctive research and innovation strengths and capacities of third countries;
- current levels of European participation in third country programmes;
- current third country policies on international collaboration as it may affect European participation; and
- any obstacles to the participation of European researchers in third country programmes.

[2] Details of this collective initiative can be obtained from: http://www.access4.eu/.

Introduction

The purpose of this paper is to provide an overview of the extent of existing collaboration between EU researchers and institutes and Australian partners, particularly the participation of European researchers and institutes funded under Australian programmes, as reflected in the data currently available from Australian programme owners.

This is an important part of the efforts of the broader project to support enhanced collaboration between the EU and Australia in research and innovation, particularly through the improved access to Australian programmes for EU researchers. In order to assess the outcomes of the project, it is necessary to establish an indicative baseline of existing collaboration upon which to make judgements into the future.

As discussed in more detail below, this task is complicated by the various levels at which international research collaboration takes place, and the differing ways in which programmes and institutions collect data on international collaboration. There is no Australian national standard for the collection of this kind of data, nor is there any international standard to allow easy comparisons between countries and regions. Data is rarely aggregated to provide a complete picture of a country's international research engagement, instead relying on indicative reporting from select institutions.

The approach taken has therefore been to work cooperatively with key Australian institutions to establish a current picture of collaboration with partners from EU member states, and their participation in select key Australian programmes. This can be further developed into the future.

Data of this sort is important as individual researchers, institutions and governments seek to make strategic decisions about partnering internationally in research and innovation. As highlighted in previous papers (see for example Matthews and Harris, 2010), this is continuing to grow in importance as the already international research effort globalises, and research is increasingly seen as a crucial input for innovation and the response to other policy challenges such as climate change, which are by their very nature international. The level of existing collaboration with a particular country or region, and the extent to which researchers can access the programmes of other countries, will be important factors informing these strategy and policy decisions, along with measures of research strength and performance, openness and reciprocity, other barriers to collaboration (such as immigration restrictions) and broader geo-political considerations.

Levels of international collaboration

International research collaboration takes place at three different levels:

First level: Individual researchers have long engaged and cooperated with peers in other countries in the conduct of their everyday work – they travel, attend conferences, work on joint projects and co-publish from within their existing resources, often without recourse to additional dedicated funding. Caroline Wagner describes these international research networks as the "new invisible college".[3]

[3] See Wagner, C. (2008). *The New Invisible College: Science for Development*. Brookings Institution Press: Washington.

Second level: Specific national research funding programmes also support international collaboration, both directly and indirectly. Programmes support individual researchers as well as the work of collaborative teams which can include members from other countries. As major funding agencies in Australia (such as the Australian Research Council) take deliberate steps to open up their programmes and re-write guidelines to encourage greater international collaboration, rates of international participation will presumably rise.

A **third level** of international collaboration is supported by funding programmes deliberately aimed at supporting engagement with researchers in other countries. The Australian Government's long-standing *International Science Linkages* programme, which ends in 2011, is an example of a specific programme which is complementary and in addition to the major schemes run by the Australian research funding councils, and which, while mainly targeted at Australian researchers, has also been available to support collaboration by providing funding to international researchers for travel and attendance at symposia and workshops funded under the scheme.

Measuring the participation of EU researchers and institutions in Australian programmes therefore requires a view across all of these different levels. Also, as this work is further developed into the future to provide a meaningful baseline, it should take into account broader changes in patterns of international activity. For example, how do changes over time in a country's share of global R&D affect its participation in international collaboration with other countries? This additional level – the broader global context – is also important in presenting a picture of participation and collaboration between specific countries and regions.

Collection and analysis of data

To inform the indicative baseline provided by this paper, data has been collected from the major Australian funding agencies: the Australian Research Council (ARC); the National Health and Medical Research Council (NHMRC); CSIRO's Flagship Collaboration Fund, and; a number of research centres that have some resources available for international collaboration, including by European researchers. Administrators were approached in 2010 to provide information from across these different levels of international research collaboration and from key Australian programmes and institutions, asking them to provide specifically:

- the numbers of European researchers currently involved in their research programmes
- the names of participating European institutions currently involved in their research programmes
- the amount of funding involved in their participation.

Responses from Australian programme owners quickly revealed that data on international collaboration and participation is published differently by institutions, and within institutions, and varies for different programmes and schemes.

Moreover the data is reported upon annually at best. In this way, the data available provides a lagging indicator that makes tracking trends and changes more regularly (an aim of this project as initially conceived) impossible. The revised method adopted for this paper was to use information available from the Forum for European-Australian Science and Technology cooperation (FEAST) and CSIRO to provide

evidence of the extent of EU-Australia collaboration overall (ie. undertaken by researchers as part of their core activities, already funded) and then to work with the following organisations to gather information on the participation of EU researchers in the major Australian programmes specifically designed to support collaborative research:

- The Australian Research Council (ARC);
- The National Health and Medical Research Council (NHMRC);
- The Commonwealth Scientific and Industrial Research Organisation (CSIRO); and
- The Australian Government's Department of Innovation, Industry, Science and Research (DIISR).

For these specific programmes, where available data permits, the aim has been to address the following initial questions:

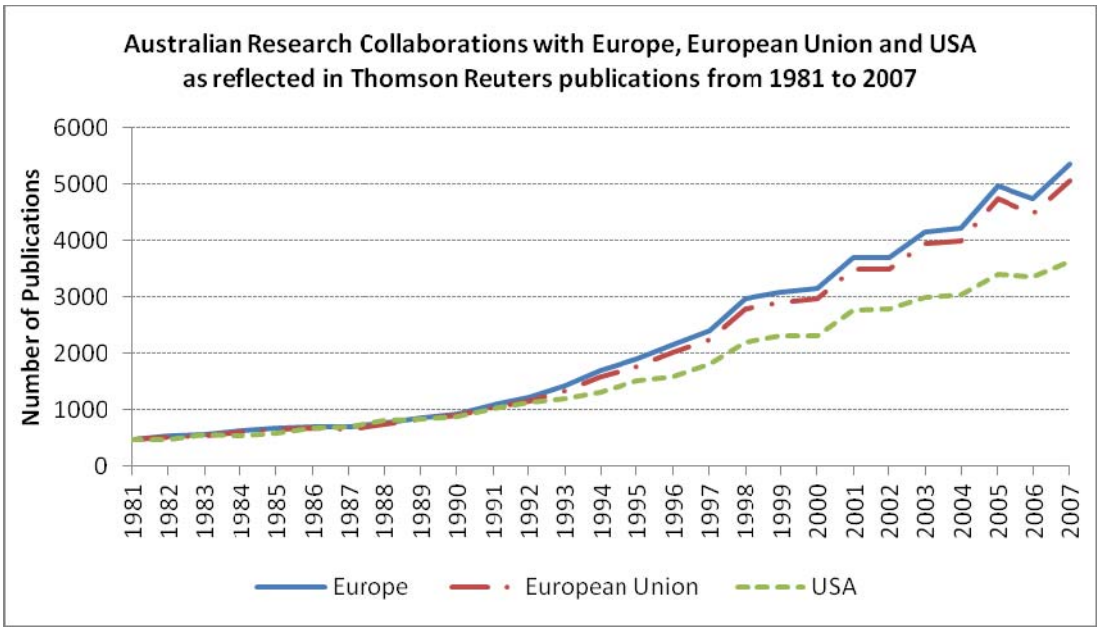
- Is the programme open to international (and specifically European) participation?
- If so, what is the number/breakdown of researchers from EU member states that have participated in the programme?
- What funding has been provided to researchers from EU member states to support this participation, and for what purposes may this funding be used?
- What percentage does EU participation account for in overall international participation?

Overall level of EU-Australia collaboration

This current investigation of European participation in Australian research programmes needs to be placed in the context of the long established collaborations between Europe and Australia. This can be tracked via bibliometric data: as part of its broader role to promote collaboration between Australia and EU member states, FEAST has undertaken research on patterns of collaboration through bibliometric data on co-authored publications by researchers. In line with the overall growth in the number of articles published by Australian researchers and the growth in international co-authoring (from 21% in 1991 to 44% in 2005), collaboration through co-authoring between researchers from Australia and EU member states has also grown as shown below. (Data and figures on this page taken from Matthews et al, 2009.[4])

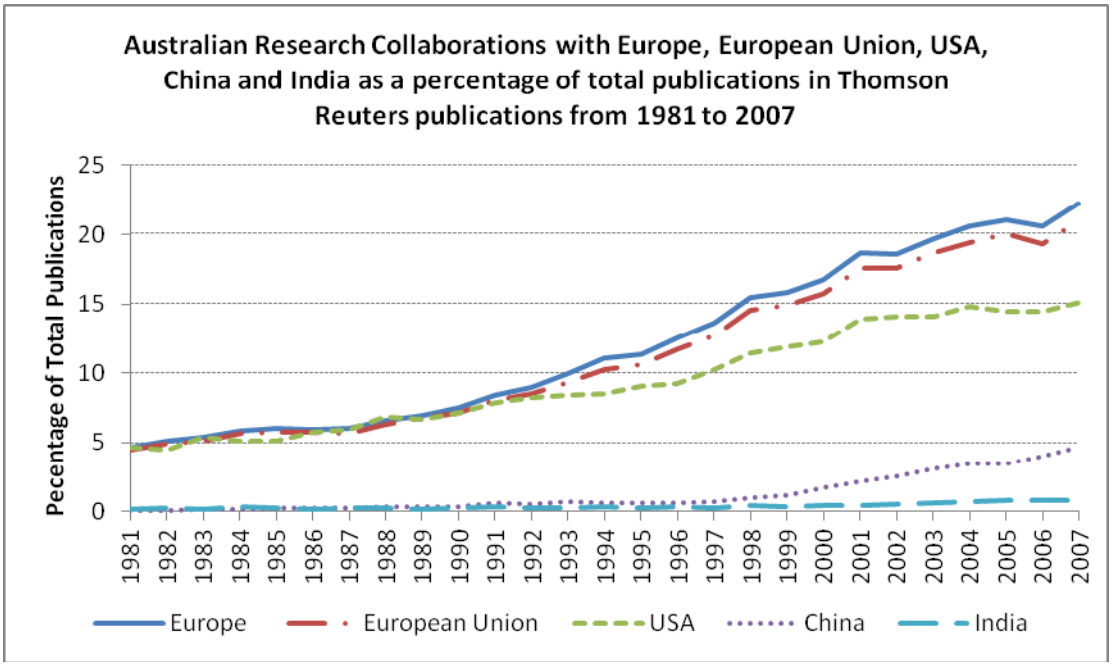
[4] Certain data included herein are derived from the Web of Science ® prepared by THOMSON REUTERS ® Inc., (Thomson ®), Philadelphia, Pennsylvania, USA. © Copyright THOMSON REUTERS ® 2006, all rights reserved.

Figure 1:



Source: Matthews, Biglia and Murphy (2009)

Figure 2



Source: Matthews, Biglia and Murphy (2009)

General levels of collaboration between Australian and EU researchers are therefore on the increase and compare favourably to collaboration with other leading research nations such as the United States and China.

Data from the CSIRO is consistent with this broader picture – in 2009 for example, CSIRO researchers recorded 1856 instances of co-authored publications with international partners. Of these, 896 or 48% were co-authored with researchers from EU member states, an increase on previous years.

While this data provides a useful overview of general patterns of international collaboration, it does not provide detail on participation by EU researchers and institutions in specific Australian programmes. For example, it is not possible at this stage with this data to link co-authored publications back to specific programmes or funding sources, an issue that was highlighted in Faletič et al 2011[5].

Conversely, it can be difficult to link information on funding back to the outputs and outcomes of international collaboration. For example, the Australian Antarctic Division (AAD)[6] reports that in 2010 it had 215 researchers from 105 institutions in 19 EU member states collaborating in its programmes, but without significant additional effort this cannot be linked back to information on specific research outputs, such as publications data. The AAD also reports that during the 2009-2010 financial year, it contributed an estimated amount of €272,000 of in-kind support to just three European researchers participating in its programmes. However, scaling up this data on the financial support (direct and indirect) provided to EU researchers collaborating with Australian institutions would be difficult for even one institution, let alone for the entire research system.

EU participation in specific Australian programmes

In addition to the overview provided above, data is available from specific Australian institutions about the programmes that they manage.

i. The Australian Research Council 7

The ARC manages the National Competitive Grants Program, with total funding of €537.5 million for the 2009-2010 financial year and open to all research fields apart from health and medical research, which are covered by the NHMRC (see below). The major suites of programmes are the Discovery Grants (for both Projects and Fellowships, which are aimed at researcher driven frontier research) and the Linkage Grants (which require collaboration with industry and other external partners, and have a more applied focus).

In a significant policy shift, since 2008-2009, the major programmes within the National Competitive Grants Program have been opened up to international applicants, and therefore European applicants, whereas they were formerly limited to Australian citizens and permanent residents. Given how

[5] See Faletič, R. Fitzpatrick, M. Glennie, K. and Desvignes-Hicks, J-F. (2011). *From interoperability challenges to syncing opportunities: a pathway to global research*. FEAST Discussions Paper 7/11: Canberra.

[6] For further information on the Australian Antarctic Division see http://www.antarctica.gov.au/. Figures in this paragraph are unpublished data provided to this project by the AAD.

[7] The following section is based on unpublished data provided to this project by the ARC. Please note that the data did not enable a standard distinction between EU/Europe across all programmes.

recently the policy changed, trend data is not yet available on the effect this has had on numbers of European researchers or the amount of funding they may have received under the new open regime.[8] The data discussed below is therefore reflective of the policies in place up to 2009.

The ARC has provided data from its major programmes on the level of formal involvement of Europe-based researchers in ARC funded projects, though they are not able to specify the Australian funding attracted by those researchers. In 2009 for example, 791 researchers working in 21 European countries were Partner Investigators or equivalent on ARC funded projects. Leading countries were the UK with 270, then Germany with 105, followed by France 74, the Netherlands 44, Italy 34, Switzerland 30, Sweden 25 and Denmark 20.

In terms of funding it is not possible to establish the amount of funding each researcher received, but the figure for the total funding for projects in which these researchers were involved (for the whole life of the projects) is €220 million.

[8] The following link http://www.arc.gov.au/general/international_collaboration.htm provides an overview of the eligibility of international researchers to apply for ARC funding under the post-2008 policies.

Table 1

Researchers working in Europe and collaborating on ARC funded projects in 2009[9]

Country of Residence	Partner Investigators (PI)	Network Participants (NP)	Overseas Investigators (OI)	Total
Austria	5		3	8
Belgium	16			16
Bulgaria	2			2
Czech Republic, The	2		1	3
Denmark	20		1	21
Estonia	3			3
Finland	8			8
France	74	1	13	88
Germany	105	3	14	122
Hungary	2			2
Ireland, Republic of	7			7
Italy	34		5	39
Netherlands, The	44	1	4	49
Norway	14			14
Poland	2			2
Russian Federation	5			5
Spain	13		1	14
Sweden	25		9	34
Switzerland	30		3	33
Turkey	1			1
United Kingdom	270	9	41	320
Total	**682**	**14**	**95**	**791**

Note to table: Includes:

- Partner Investigators (eg Discovery Projects, Linkage Projects, ARC Centres of Excellence schemes)
- Network Participants (ARC Research Networks scheme – now discontinued)
- Overseas Investigators (Linkage International scheme – now discontinued)

[9] This table was provided to the authors by the Australian Research Council.

In relation to the broader collaborations (ie those that did not necessarily attract funding for international collaborators) indicated by successful Australian based applicants for ARC funding, in 2009 the ARC funded 1710 projects involving international collaboration with European countries across 10 schemes and across 115 research disciplines (as defined by the 4-digit Research Fields, Courses and Disciplines (RFCD) code attached to each proposal as the major disciplinary approach). Of these, 1091 involved collaboration with more than one EU country. Of all instances of international collaboration on projects with an ARC funding allocation in 2009, 45.1% involved collaboration with an EU country, far outstripping North America (29.8%), the next largest region. The ARC has further provided data that in 2009, 168 European citizens from 20 countries held ARC funded fellowships, but they point out that many of these researchers were at the time residents of Australia. Given the data collection currently in use, it is not possible to separate out those European citizens based in Europe who accessed the funding, nor to identify Europe-based researchers who are not European citizens. Total funding over the life of these fellowships was €80 million.

We could summarise by saying that:

- the major programmes within the National Competitive Grants Program are open for international applicants to obtain funding. This openness has recently been strengthened and the take-up by EU researchers could be expected to rise;
- the level of collaboration with Europe within these programmes is already substantial in terms of the numbers of researchers and institutions involved in ARC-funded projects and the range of fields in which they are working; and
- it is not possible at present to determine a total amount of funding to EU researchers and institutions, nor therefore the percentage of total funding going specifically to them.

ii. The National Health and Medical Research Council [10]

The NHMRC manages competitive funding for the health and medical research sectors, for projects, fellowships and infrastructure and facilities, with a total budget of €583 million in the 2009-2010 financial year. Taken as a whole, the NHMRC research funding programmes are not open to applications for funding from Europe-based researchers or institutions, although overseas-based researchers may take a prominent role within individual NHMRC-funded project grants. Therefore there is no data for numbers of EU

[10] The following section is based on unpublished data provided to this project by the NHMRC.

researchers or institutions receiving funding or the amount of funding they receive.

This is not to say that NHMRC funding does not support EU researchers in any way. The data supplied to this project by the NHMRC naturally reflects the Australian component of a long-standing and substantial exchange of researchers between Europe and Australia, where individual researchers often work within the facilities of their collaborators with their personal expenses paid by their own institution or national funding programmes. Between 1999 and 2009, for all NHMRC grants other than the ones specified above, a total of 137 Australian-based researchers received grants to work in some 87 institutions in 15 European countries, with the UK, Germany, Denmark and Sweden being the top destinations.[11] Figures are not available for the degree of symmetry of this mobility, since the reciprocal mobility is not funded through the NHMRC.

The NHMRC's most significant programme in terms of the support it gives to European research does not directly fund European research but rather enables Australian partners of any Seventh Framework Programme (FP7) consortium in the Health theme to access funds in order to fulfill their deliverables. The NHMRC-European Union Collaborative Research Grants Program provides funds specifically to support the Australian partners of successful FP7 proposals.[12] For the period 2001-2007, for instance, this fund provided €6.6 million in support for participation in 21 FP5, FP6 and FP7 projects. This funding programme recognizes the constraints on Australia as a Third Country under the FP7 rules, which make Australian researchers ineligible to receive most forms of funding under FP7. The process for this fund is that as soon as an FP7 proposal has been peer reviewed by the EC and is favourably evaluated for funding, the Australian participant lodges an application with the NHMRC. The success rate is almost 100%, and the funding per application has ranged between €100,000 and €750,000.

The NHMRC has its programmes actively under review, including the access it provides to international researchers. In the meantime, it is worth considering the role played by Australian research infrastructure in the health field, a major recipient of government funding, and whether the value of access to infrastructure should be taken into account in any quantification of the degree of access to Australian funding enjoyed by international researchers, including EU researchers.

iii. The Commonwealth Scientific and Industrial Research Organisation[13]

In addition to the general level of international collaboration undertaken by CSIRO (set out above), the organisation also manages the Flagship

[11] Please note that the data did not enable a standard distinction between EU/Europe across all programmes.

[12] Details of this grant can be found at http://www.nhmrc.gov.au/grants/types-funding/nhmrc-european-union-collaborative-research-grants.

[13] Further information on the Flagship Collaboration Fund may be found at http://www.csiro.au/org/Flagship-Collaboration-Fund-Overview.html

Collaboration Fund, which can fund international collaboration. The Fund was established in 2005 as part of the broader National Research Flagships programme, and funds collaborative research activity with researchers outside of CSIRO in four forms: three-year "clusters", shorter-term collaborative projects; visiting fellowships; and postgraduate scholarships. All of the Fund is spent towards researchers and organisations outside of CSIRO, to enhance CSIRO's collaborations.

When the Fund was established, only the visiting fellowships component was open to international participation. However, CSIRO sought and received Australian Government approval in 2008 to open up the other components of the Fund to participation by not-for-profit research institutions worldwide. Fifty-three separate institutions have received financial support from the Fund – of these 24 are from outside of Australia and 11 are from EU member states (46%). Funding to date to European researchers and institutions accounts for approximately 33% of all funding to international partners, and for almost 2% of total funding under the programme.

iv. The Department of Innovation, Industry, Science and Research[14]

In addition to its broad portfolio responsibility for the Australian Research Council and CSIRO, whose programmes have been discussed above, DIISR manages other funding programmes important within the Australian competitive funding system, and which involve opportunities for international researchers to access funds.

International Science Linkages

The International Science Linkages (ISL) programme has been specifically targeted at enhancing international research collaboration, providing grants of between €3,750 and €751,000 for a range of collaborative purposes. It has complemented existing funding, providing for instance for travel, or funding for workshops bringing together international collaborators on a project, often accessed where the funds for these activities have not been available within mainstream research grants. It has also enabled Australian researchers who are participants in FP7 projects to access money to take part in project activities, which as Third Country researchers they have not been eligible to access through project funds. Current ISL programme funding ceases in 2011, and its role and performance have been subject to review by the Australian Government.

European researchers have been eligible under the rules of the programme to access travel money for airfares and living allowance, although not salaries, in order to participate in collaborations with Australian researchers and institutions. The data provided by DIISR on the ISL programme, covering the period 2000-2010, does not indicate the amount of funding received by EU researchers. The data does, however, reflect at the descriptive level a substantial degree of collaboration with EU researchers, consistent with the broad findings on the level of collaboration mentioned above.

[14] This section is based in part on data provided to this project by DIISR.

Cooperative Research Centres

The Cooperative Research Centres (CRC)[15] programme has the aim of building a critical mass in research ventures between end-users and researchers, seeking high-impact innovative solutions to major challenges which end-users will be able to deploy. Currently, 42 CRCs are active, with an Australian Government contribution of €149 million for the 2009-2010 financial year. Increasingly in recent years CRCs have included international partners, and some have been using their funds to attract international researchers, including PhD students and postdoctoral researchers. While each CRC mentions the countries with which they collaborate, the detail of which institutions and how many researchers are involved and whether any of the Australian Government support for the CRCs (only a portion of their larger funding base) flows to these individuals is not available at this stage.

Developing a template for data collection

As of 2009, the Australian Government has adopted seven National Innovation Priorities, in addition to its National Research Priorities. The National Innovation Priorities state the objective that "Australian researchers and businesses are involved in more international collaborations in research and development". In light of this, improved data collection is necessary in order to be able to measure progress against this priority, including levels of international collaboration the country's researchers and research institutions are engaged in; to what degree Australian Government funding directly supports international researchers and institutions, and; what proportion of overall government funding for research that represents. A template accepted across all Government funded programmes that provided a minimum range of information from each would enable benchmarking on international collaboration across the system, of value to the increasingly important arena of international science collaboration, and science diplomacy, more generally. Any template should be designed to require minimal additional information from the application process. From the notes provided by programme owners accompanying their data on the constraints they currently face, collection of the following two categories of information would assist substantially in this task:

- country of residence at the time of application of each named Investigator (since citizenship is not necessarily a guide);
- amount of Australian programme funding per international institution or non-resident researcher.

This data would be sufficient to establish the Australian funding contribution to its international research partners, and would provide considerable assistance in being able to quantify the amount of openness and reciprocity Australia offers to the world in this increasingly important arena.

Discussion and conclusions

In the context of the AUS-ACCESS4EU project as a whole, the purpose of this paper was to provide a baseline against which trends in the engagement of EU researchers

[15] Further information on CRCs can be found at http://www.crc.gov.au/ and http://www.crca.asn.au/.

in collaboration with Australian researchers through Australian-funded programmes could be tracked. The effort to do this reveals, not unexpectedly, that Australian programmes do not currently collect data in such a way as to make this a straightforward task. In this, Australian programmes may be little different from their counterparts in other countries, and may in fact have more accessible data for this purpose than some. Despite and because of the constraints of the data available, a number of conclusions can nevertheless be drawn:

- Overall, there is consistency across different metrics and programmes that collaboration with EU researchers and institutions accounts for approximately 45% of total Australian international collaboration (and this shows signs of rising over recent years).
- To be able to track these trends or interrogate the data in any detailed way will require changes to the way data about international collaboration is gathered and reported.
- This has implications for programme owners and programme design, particularly given the increasing importance being placed on international collaboration by governments in Europe and Australia, and in particular if Australian agencies are required to report against the National Innovation Priorities.
- Specific data on the amounts of funding from Australian programmes received by researchers and institutions in the EU is not currently able to be gathered and aggregated in a way that would enable regular tracking or trend analysis.
- Minimal changes to funding application forms to include the current country of residence, as opposed to citizenship, of individual applicants and the amount of funding to go to international institutions and researchers would allow for more detailed analysis of participation and funding flows in international collaborations.
- Gathering and tracking improved data about international collaboration into the future may require being able to identify individual researchers in the records of (funding) programmes in a number of countries, an approach being investigated now by, for instance, the Science and Innovation Policy programme at the National Science Foundation (NSF) and others in the United States. Canada's Consortia Advancing Standards in Research Administration Information (CASRAI) is working to establish internationally agreed language definitions to enhance global research. It would be useful to study these and other initiatives to inform Australian developments in this area of data standards and collection.

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