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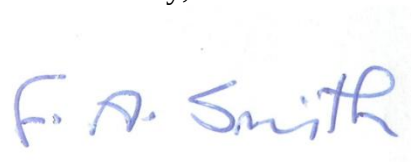
Committee Secretary,
House of Representatives Standing Committee on Industry, Science and Innovation,
Parliament House
CANBERRA ACT 2600

Dear Secretary,

Submission to the Standing Committee on Industry, Science and Innovation: Inquiry into Australia's international research collaborations

The following pages are a personal submission and should not be read as representing the views of The University of Adelaide. As is stated, it reflects my experiences as 1) a scientist actively engaged in international collaborations in research, 2) a frequent representative of the Australian Academy of Science in relation to international research-related activities, and 3) Chair of panels that assess several components of the International Science Linkages scheme, run by the Department of Innovation, Industry, Science and Research (DIISR). I have no objection to the submission being made public, and am willing to appear as a witness in a public hearing, if the Committee wishes this.

Yours sincerely,



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Submission: Australia's international research collaborations

Professor Andrew (FA) Smith FAA

Summary

- Here I deal briefly with the Inquiry's first four terms of reference, and then focus on the role of the Commonwealth Government's Department of Innovation, Industry, Science and Research (DIISR).
- I regard DIISR as having a key role in relation to supporting international science research collaborations, especially because its programs also serve the interests of several other Commonwealth Government departments.
- I give an overview of the present DIISR international programs from my personal perspectives, and propose ways in which DIISR's programs should be strengthened and their impact increased

My perspectives

This is an important inquiry, and my hope is that as a result there will be increased recognition in Government of the importance of international research collaborations, and hopefully a significant increase in funding specifically for this purpose. Minister Carr is of course absolutely correct in saying (in a speech at the end of September 2009) that everyone thinks their needs are paramount and that inevitably nobody gets everything they want. He is correctly very proud of the extra $3.1 billion for research and innovation in the 2009 Budget. However, international research collaboration seems to have been overlooked in increasing dedicated funding. This is something that needs serious attention in relation to Australia's international profile in science and technology.

The success of my long University career in Australia in the area of plant and soil biology has resulted in very large measure from international collaborations in research, initially in Europe (UK and then Denmark). Without these I would almost certainly not be a Fellow of the Australian Academy of Science (AAS). Over the last 10 years I have established strong research-related links in China, and my perspective in this submission includes my experiences as an unofficial 'ambassador' for many AAS activities involving China. Last, I have served for a number of years as Chair of the selection panel for research grants awarded in several components of the International Science Linkages (ISL) program run by what is now DIISR. This service has given me wide knowledge of the impressive international activities – and aspirations – of Australian researchers.

The views expressed here are my entirely my own. The submission is DIISR-oriented because the Department has a key role in fostering international research collaborations through its various programs, which extend widely across science and technology (including agriculture and medicine), and include applications in industry. In my opinion this role should be considerably strengthened.

Terms of reference

I address the first four only superficially, as they will doubtless be well covered in other submissions.

1. The nature and extent of existing international research collaborations

Science (in the broadest sense) knows no boundaries, and not surprisingly collaborations extend worldwide across the whole research spectrum, apart from any limitations of confidentiality and (e.g. for defence science) security. Many collaborations start bottom-up, which is why provision of support for small-scale projects is important. These can lead to bigger international initiatives, including joint Research Centres such as the University of

Melbourne's very successful Australia-China Centre on Water Resources Research. At the top end of the scale, there are projects well beyond the funding capacity of individual countries. This is well shown by the large EU Framework programs in which our researchers can participate – depending on funding from Australian sources. The Square Kilometre Array ('Radiotelescope for the 21st Century') is another example. Collaborations are increasingly extending beyond the USA and European countries to the Asia-Pacific region, and especially China (of which more later). In important recent *Global Research Reports*, Thomson Reuters have called this 'the new geography of Science'.

2. The benefits to Australia from engaging in international research collaborations

By participating in international research, Australian researchers increase overseas awareness of our research, leverage international research funds and so increase overseas investment in our research and development. This is well recognized by Government. Research cooperation can assist in international aid (e.g. with respect to agriculture and medicine), and can increase good-will more generally. It can have diplomatic benefits, e.g. as an outcome of negotiations between high-ranking delegations to and from Australia. The establishment of the Australia-India Strategic Research Fund can be seen in this light.

3. The key drivers…

At the government level these relate primarily to the preceding section. ***At the institutional level*** they include research quality and hence reputation, as with Universities that promote themselves as research-intensive at the international level. Research quality at this level is a factor in the increasingly influential international league tables such as that produced by the *Times Higher Education Supplement*. It also influences applications by intending overseas PhD students, post-docs and research visitors, although reputation of the researchers also has a major role. CSIRO rightly prides itself on its strong international reputation, and other research institutes such as the Australian Institute of Marine Science (AIMS) are increasing their international engagement.

At the researcher level the driver is quality of personal research, and the increasing recognition that it is now very difficult for most scientists to 'go it alone' – hence the increasing teamwork both nationally and internationally.

4. The impediments faced by Australian researchers when initiating and participating in international research collaborations are time (for travel), distance (to travel) and (lack of) money. The overseas partners who seek to visit Australia face the same impediments. Provision of leave of absence for research overseas is the responsibility of the employer. Distance relates to money, obviously including air-fares. Electronic communication by itself is inadequate, except for exchange of ideas and data, writing reports etc. It is especially inadequate for research training for postgraduates and postdocs. Costs include those for living, but the most important factor is the increasingly high cost of research in science and technology. Research costs to partners can no longer be absorbed into other funded projects. The only practical measure is to provide more money specifically for international collaborations. Ideally, this should be done by bilateral (or multilateral) agreement, so diplomacy is again a factor.

5. Principles and strategies for supporting international research engagement are addressed by the many agencies in Australia that provide funding. These spread across all sectors of research, including the humanities and social sciences. Thus they involve directly or indirectly several Commonwealth Government ministerial portfolios. State Governments are also involved, though my feeling is that some (e.g. Queensland and Victoria) are much more active than others. Funds are provided variously for short visits, more extended projects involving modelling, monitoring or experiments, and major initiatives, again including joint research Centres. Provision of tangible cash support by applicants in Australia and/or bilateral cash support by partners is required in some schemes but not in others. Priorities include

fields of research and individual countries or regions, sometimes in terms of perceived tangible national benefit, sometimes not. All this is as it should be: the question is whether there can be improvement. I believe that there can.

Some significant providers

Doubtless the main organizations that fund international research are making individual submissions to this Inquiry. Here I summarize some of the providers to make particular points later. Agricultural science is served by the Australian Council for International Agricultural Research (ACIAR), which lies within the Commonwealth Department of Foreign Affairs and Trade (DFAT). The Academy of Technological Sciences and Engineering (ATSE) Crawford Fund is an independent body, with support from DFAT and State Governments. Both ACIAR and the Crawford Fund have regional and country priorities, and both are oriented strongly to international aid, including training of scientists from overseas. The Grains Research & Development Corporation (GRDC) primarily has 'crop' priorities, and has international activities, again including training (Visiting Fellows). It falls under the aegis of the Department of Agriculture, Fisheries and Forestry (DAFF). DIISR also includes agricultural science within its international schemes, but these are not targeted at aid or training, though there can be a component of this for young scientists included in the projects.

In contrast to Agriculture, Government funding specifically for international collaborative research in medical science does not (surprisingly) have a high profile as far as I can see. The National Health & Medical Research Council (NHMRC) Website mentions limited funding for projects associated with the EU Framework program. Otherwise, international NHMRC projects apparently fall within its 'Strategic Plan Initiatives', targeted towards SE Asia and the Asia-Pacific region. DIISR includes medical research in its 'International Science' schemes; not surprisingly there are many applications.

For about 10 years until 2009, the Australian Research Council (ARC), part of the DIISR portfolio, had funding programs specifically for international collaborations, firstly the International Research Exchange (IREX) scheme and then Linkage International. Funded international collaborations have now been rolled into the ARC Discovery Projects (DPs), which can include International Collaborator Awards (ICAs). Funding for ICAs is considerably more restrictive than under the previous ARC international schemes, for the following reasons:

1) Funding allows a maximum of one visit by a Chief Investigator (CI) or Fellow per annum (or one for an incoming partner investigator), for between 1 month and 6 months. There is no funding specifically for visits by research teams, post-docs or postgraduate students (ARC Discovery Rules, Section 8.2.6). Possibly such visits may be allowable from DP funding that is not earmarked, but it has to be remembered that the overall funding granted to successful DPs is only about 65% of that requested, i.e. there is little scope for flexibility.

2) Depending on their status, ARC Chief Investigators can hold only one or two DPs (ARC Rules: 6.6.2). As DP grants are for 1-5 years (usually 3), long awards could preclude opportunities for new international collaborations during the duration of DPs. This was not a problem when the previous ARC international schemes were independent of DPs.

DIISR schemes other than ARC

As noted above, fields of research supported by these schemes are very broad, covering agricultural science and medicine as well as those areas that lie within the ARC Discovery Projects, including the humanities and social sciences**.**

On the DIISR 'International Science' Web pages the schemes are given as follows:

- International programs, grants and funds; comprising:
  - Australia-India Strategic Research Fund

- International Sciences Linkages (ISL) Program
- Collaboration with the Americas
- Collaboration with the Asia-Pacific Region
- Collaboration with Europe
- Collaboration with South Africa
- Collaboration with multilateral and regional organisations; comprising:
  - Asia-Pacific Economic Cooperation (APEC)
  - European Union (EU)
  - Organisation for Economic Cooperation & Development (OECD)
  - The UN Educational, Scientific & Cultural Organisation (UNESCO).

As far as I can work out, only the first scheme in the list provides funds for international science research projects or associated activities. The breakdown of the ISL Program illustrates this. It currently comprises (DIISR Website and media announcements):

1) Australia-China Special Fund for Scientific & Technological Cooperation (research visits & projects: $1.5 million awarded in 2009
2) French-Australian Science & Technology Program (FAST) (research visits & projects: $250k in 2009)
3) Australia-Europe Research Collaboration Fund (about $4 million? ISL Website revised 1 Feb 2010)
4) Science Academies Program ($1.5 million)
5) Humanities, Arts & Social Sciences Academies Programs (under development; visits & projects: $82k in 2009.

Of these, the Australia-Europe Fund is not an open application scheme in that DIISR develops proposals to strengthen strategic research links with the EU, and 'may invite submissions from researchers or research organisations to deliver them' (DIISR Website). In addition, the ISL program has (DIISR Website: 'ISL Overview') a Strategic Policy component, again not an open application scheme but another in which DIISR develops proposals – this time to benefit the ISL program – and again it 'may invite submissions from researchers or research organisations to deliver them'.

What has been the flagship component of the ISL Program, the 'Competitive Grants' (CG) scheme, seems to have been abandoned. It is still mentioned in the 'DIISR ISL Overview' Web pages, but not in the main 'International Science' pages. A round of applications for CGs was unfortunately called off at short notice early in 2009 because funding was not allocated to DIISR in the Budget process for 2009-2010. Formerly it had been a world-wide program with priority research areas, but had been narrowed down in 2008 to include only a limited number of priority countries, plus the EU Framework Program. The problem now is that is that any researcher who turns to the DIISR 'Collaborations with…' list (given above) is referred to the ISL scheme, but there is in fact no opportunity to obtain competitive funding from DIISR for research projects in much of the world. The abolition of the ARC Linkage International projects has exacerbated this problem. Possibly, funding for EU Framework projects may be selected as part of the DIISR 'Collaboration with Europe' scheme. I have no idea how this would be done.

A significant gap is now Brazil, a developing partner country, and one that had sensibly been included in the aborted CG program. DIISR is to be commended in trying to cope with this externally imposed situation in an ad hoc way, for example by the 2009 call for a very small round of Australia-Japan collaborations in marine biology. Doubtless there will be other examples in 2010, but this is very far from a high profile and well planned strategic approach for international research collaboration (not the fault of DIISR).

Roles of the DIISR international program grants

I regard the competitive grants (all types) as an essential component of Australia's overall funding strategy for the following reasons:

- The awards extend beyond the areas covered by ARC, e.g. agriculture and medicine. Tangible benefits of international collaborations are seen as relatively more important, e.g. in relation to Industry but also in research training.
- The awards are flexible within quite broad funding limits and allow applicants to follow up opportunities irrespective of any prior ARC funding, or funding from other agencies, provided that it is not for the same project.
- The application process is relatively simple (e.g. compared with ARC DPs).
- The awards can cover the whole spectrum of research, but can be tied to research priorities as agreed by DIISR with partners, e.g. in MOUs. Also, joint decisions on funding can be made, as with China and France at present.
- New priority countries can be included when desired. (ARC has no priority countries for DPs, only research priorities.)
- Adding country names to a revived CG scheme would be at least one way of showing high-level delegations an outcome, even if there is no extra money in the scheme. Otherwise delegations can depart very disappointed, as I know from my own contacts.
- Last – and important in my opinion – having 'named' international research schemes is much more impressive for Australia's international profile in science and technology than having international collaborations 'hidden' in (for example) ARC DPs.

India and China: a brief comparison

The Australia-India Strategic Research Fund was an initiative of Prime Minister Rudd and is now funded at $50 million p.a. over the next five years – in other words its funding is almost exactly the same as that for the whole of the ISL Program for the 'rest of the world' – or what is left of the world in the absence of the CG program. (The current ISL Program has on average $9.4 million p.a. for 9 years) For comparison, the Australia-China Special Fund in 2009 allocated only $1.5 million (17 grants; success rate less than 10%) and its future at present seems uncertain. As is well known, science and technology is much further advanced in China than in India. The recent *Global Research Report* by Thomson Reuters (November 2009) shows that much of China's research in science and technology is already world-class, and investment there will soon outstrip that in the USA. Chinese research links with Australia have developed very considerably over the last 10 years. This has resulted to a large degree by initiatives from China, not from Australia. There have some very high-level delegations of senior government officials and scientists to Australia and an ongoing annual series of China-Australia planning symposia on Science and Technology, held alternately in Australia and China and focusing mainly on energy and sustainability issues. Funding in Australia has been provided by DIISR under its Strategic Policy component to AAS and ATSE, who are the Australian organisers. DIISR has also been involved in other planning meetings with its counterparts from China, notably the Joint Science & Technology Commission (JSTC) meetings. The last was in Perth in April 2008. It was indicated by DIISR that, despite increased funding from agencies in China, there was then no opportunity for increased funding from Australia, e.g. for the Australia-China Special Fund.

There have also been high-level visits to China, e.g. by Minister Carr and his team, and from CSIRO and individual Universities in Australia. Last and by no means least there is intensive networking by senior scientists who have settled in Australia from China, or who have returned to China after working here. The Federation of Chinese Scholars in Australia (FOCSA) runs its own conferences with high-level representation from China. Goodwill is strong and important joint projects are well under way, but I know from my own high-level

contacts that officials and senior researchers in China are disappointed by lack of tangible outcomes in terms of increased Australian funding for joint research. The very large funds allocated for research with India have certainly been noticed. The Australia-China Special Fund was last renewed in 2007. I hope that there are current active negotiations for renewal for another three years. I believe that Minister Carr and DIISR will have significant input into the forthcoming Shanghai Expo, and this would be an excellent opportunity to renew the Special Fund, Clearly, if it is not renewed and considerably strengthened we will show up very poorly and certainly lag behind other countries that are strengthening their research links with China.

In comparison, India is a long way behind, and its capabilities in science and technology are still developing relatively slowly. The Thomson Reuters *Report* for India (October 2009) shows that in 2007 there were about 30,000 scientific publications with authors from India in its 10,000 indexed journals, compared with about 16,500 in 1998. The report for China gives 112,000 publications for 2008, a huge increase over the 20,000 in 1998. The number of journal publications from India with Australian co-authors is relatively (as % of total publications) only about one-half of those from China. The Australia-India Strategic Research Fund can be regarded as having an 'aid' component that is not needed for China but even so, the issue to my mind is whether funding from Australia for research collaborations with India and China is well balanced. Given the present scales of research collaborations, I think not.

My suggestions

The present ISL programs are up for review and renewal in 2011, so now is the time to plan revisions.

I suggest the following:

- The competitive funding for research travel and projects should be re-badged under the title 'Strategic International Research Programs'
- The present hierarchy (see above) should be changed so that the strategic country-based programs are on an equal footing. I see no reason why the Australia-India Strategic Research Fund should be at a 'higher' level than the others that are lumped under the present ISL Program. (I appreciate that there may be impediments to this that I don't know about.)
- The Australia-China Special Fund should be renewed as a high-priority issue and its funding greatly increased. Discounting an 'aid' component that may be a factor for India, there should be at least $5 million p.a. for China, given present demand. At least one grant annually should be to help establish a Joint Research Centre – something of great significance for China (JSTC meeting, 2008).
- Other named 'country' components, e.g. FAST, should be identifiable if negotiations and MOUs warrant this.
- The suspended CG scheme should be renewed to include other named priority countries and the EU Framework programs. I would prefer this scheme to return to a worldwide scheme with 'bonus' scores in assessment for priority countries but this is a secondary issue. Its funding level needs serious attention: increased involvement in EU Framework programs warrants at least $10 million p.a.
- The purpose, size and use of the present Australia-Europe Research Collaboration Fund is now made clearer on the DIISR/ISL Webpages – revised 1 Feb 2010). To what extent is it still needed if the CG scheme is renewed? If DIISR invites submissions from researchers or organizations as stated, then this needs to be done on the basis of expert scientific advice. There is nothing clear at present about how this is done.

- The present Science Academies programs and Humanities, Arts & Social Sciences Academies Programs should be retained and, depending on cases put by the Academies, strengthened. At present, funding looks meagre to me.
- DIISR should ensure that it has regular contacts with AAS and ATSE, on which it depends for advice and delivery of some of its programs.
- In delivering all these programs, DIISR needs an established high-level advisory committee. This should be chaired by the Chief Scientist, and there should be strong representation from AAS and ATSE. The Academies of the Humanities and the Social Sciences should be consulted in relation to the further development of the program that they administer in the present ISL scheme. In maintaining an overview of DIISR 'Strategic International Research Programs' this committee should keep in mind related programs, e.g. under ARC or the other providers mentioned above, and liaise as appropriate.
- Importantly, there needs to be appointment of a Science Counseller in Beijing as a matter of urgency, to match the recent DIISR appointment for the USA – especially because 1) investment in science and technology in China will soon outstrip that in the USA, and 2) lack of such a position contrasts very unfavourably with such appointments in China by EU countries.

In conclusion, as I said at the outset, the only practical measure for increasing international collaborations is to provide more money specifically designated for this purpose. Given that DIISR supports 'whole of government' research, reallocation of funding between Ministerial portfolios should be seriously considered in the Federal budget process. The sums I have outlined above are really very small in budget terms.

Andrew Smith
10 February 2010