

Inquiry into Australia's international research collaboration

Submission from FEAST

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Preamble

The *Forum for European–Australian Science and Technology cooperation* (FEAST) is an established high-profile unit dedicated to facilitating effective research cooperation between Australia and Europe. FEAST is hosted by The Australian National University on behalf of the entire Australian research and innovation community. The unit plays an active role in facilitating Australian–European research and innovation cooperation via a two-pronged approach:

- informing the evolution of public policies and funding arrangements that impact upon international research and innovation cooperation, and;
- formulating effective strategies toward international research and innovation cooperation at the institutional level (in universities, research agencies, businesses and non-government organisations) and advising on tactics at the individual, group or team level.

The overall objectives of FEAST's activities are to:

- maximise the likelihood that Australian researchers can exploit attractive and feasible cooperation opportunities with the far larger European research, development and demonstration effort, and;
- maximise the likelihood that opportunities for attractive and feasible research cooperation exploiting Australian capability of use to Europe are exploited effectively.

Given our role, FEAST welcomes this opportunity to provide a submission to this Inquiry.

Introduction

Globally, approaches to international engagement in research and innovation are in a state of transition. Broadly speaking, this transition reflects the intention to 'de-nationalise' many areas of research funding – to move away from framing research policy in nation-centric terms and to move towards a more internationally connected policy stance. This new policy stance seeks to balance the complex opportunities and risks associated with international engagement (more to gain but more to lose) against a wide range of national policy priorities. Many of these policy priorities extend way beyond research policy per se (i.e. diplomacy, national security, countering crime and disorder, disaster preparedness).

This transition is being driven by the recognition of two factors. Firstly, the disadvantages of overly nation-centric

research policy frameworks that can, from a global perspective, lead to the wasteful duplication of research activities and the under-exploitation of the advantages of scale, scope and synergies between distinctive competencies in research. Secondly, growing awareness of global challenges, especially as regards threats to most, if not all, nations. These challenges are 'wicked problems' that tend to require collective global responses.

Whilst these collective global responses may not rely exclusively on research, it is rarely the case that these responses do not require research. Furthermore, research is often the mechanism that alerts us to the very existence of these threats by seeking to work out what the future may have in store for us. This 'preparedness' outcome that arises from research is a key driver of innovation priorities, public interest research acting as a focusing device for private sector initiatives, and public-private research partnerships, see Matthews, M. (2009).

The process via which Australia set its *National Research Priorities* in 2003–04 exemplified the nation-centric ethos. This was because the approach taken largely ignored the fact that challenges, such as an ageing population, are faced by numerous OECD nations. Research-enabled solutions to such challenges not only open up the potential for collective research efforts, they may also reveal the political, social and economic tensions and threats that governments must handle via diplomacy and other mechanisms.

The inter-connections between research policy and other policy domains highlight the importance of developing effective mechanisms within government for partnering with the research community (nationally and internationally). If policies are to be 'evidence-based' then it is increasingly likely that this evidence will either be derived from, or strongly influenced by, findings from research (and rarely research results exclusively from a particular nation). Consequently, nations that pursue highly nation-centric approaches face a 'double whammy'. They risk becoming isolated from the mainstream because they cannot demonstrate 'good global citizenship' in collective responses to global challenges. Secondly, they will have sub-optimal access to the results and insights arising from the collective international research effort. In most cases this sub-optimal access will be manifested in only becoming aware of significant research findings when work is

published (and accessible to all). Given the key role of governments in handling the uncertainties and risks that markets cannot cope with very effectively, the early warning of significant findings gained from the pre-publication phase and facilitated by engagement in major international projects is a key benefit in most policy domains. In short, modern governance cannot function effectively without access to internationally engaged research capability.

In the new internationalised research regime that is emerging, reciprocity and openness in research funding are likely to become key concerns in diplomacy – just as they have traditionally been in trade. Barriers put up to limit international engagement in research (whether deliberate or unintentional) will start to attract the same sort of negative attention as have long existed in trade negotiations and disputes. In the emerging era, major research funders (e.g. the European Research Council and the US National Institutes of Health) are open to receiving proposals from citizens of other nations resident in other nations. The stipulation is usually that the research grant can only be taken up via a host institution in the donor nation or national block (in the European Union's case). Furthermore, these major research funders are also developing reciprocal access relationships that do not require researcher re-location (e.g. the reciprocal funding access arrangement between the US National Institutes of Health and the health domain of the European Union's Seventh Framework Programme). Of course, such (major) benefits will not be open to nations that choose to exclude themselves from the emerging international research system. Given that Australia only accounts for some one percent of the global R&D effort (once estimates for non-OECD economies such as China are considered) – and this share may fall further in the long-run – a failure to articulate and develop a capability to act as a fully 'inter-operable' partner in collective global multilateral research activities and bilateral arrangements will limit the efficiency and effectiveness of the 'national' research effort.

It is significant in this context that the European Commission has launched a set of inter-connected projects that aims to raise awareness of the opportunities for Europe-based researchers to access funding and to collaborate with colleagues in a range of non-European nations. Projects with this pragmatic 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 programs.

The Australian project is led by the *International Bureau of the German Federal Ministry of Education and Research* and also involves FEAST, 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. In addition to aligning efforts with those in the other participating countries, the Australian element of the project (led by FEAST) is also carrying out some exploratory work on the potential for developing measures of openness and reciprocity in access to national research funding systems.³ This multi-country "ACCESS4EU" initiative is a clear indication of the increased emphasis now being placed upon openness and reciprocity by the most powerful research performing nations.

It is also important for policy-makers to be aware that building an effective stance on international engagement in research does not necessarily require a large quantum of funding to cross national borders. The essence of effective international cooperation is *reciprocity* – arrangements via which bilateral or multilateral partners deliver reciprocal resources (e.g. host staff and students by bearing their costs *in the host nation*, pay for research instrument and laboratory costs *in the host nation* etc.). It is possible to construct vibrant and productive international cooperation by making it easier for such reciprocal relationships to be established and maintained. Finance Ministries need not be asked to sanction overseas payments. This is why FEAST has proposed inter-governmental liaison to develop a '*Standard International Research and Innovation Cooperation Agreement*' (SIRICA) template. The SIRICA would be a generic legal template designed to significantly reduce the transaction costs and lead times (and risks) involved in establishing new reciprocity-based bilateral and multilateral cooperation agreements, see Matthews, M. (2008). FEAST is currently in the process of discussing how best to proceed with the SIRICA project with some carefully selected governments outside of

³ Details of this new collective initiative, which is known as ACCESS4EU, can be obtained from: <http://www.access4.eu/>.

Australia, and the concept is also receiving significant domestic support within Australia.

Our final introductory point is that the recent trend to seek to closely couple science policy and innovation policy has compromised the ability of our policy framework to articulate an effective strategy for international engagement. This close coupling was exemplified in the Cutler Review's efforts to make the case for support for science on the basis of the link with innovation and productivity growth. Innovation is largely a competitive national issue that therefore, in general terms, makes it more difficult to argue the case for enhanced international cooperation. This is not the case for public science, and especially the public science that generates preparedness (early warning of threats, etc.) and addresses global concerns through collective action. The efforts to conflate innovation policy and science policy are, arguably, a misjudged attempt to support funding for science. It would be preferable to de-couple arguments in support of innovation (a more nation-centric policy domain) with arguments in support of public science (an inherently international policy domain).

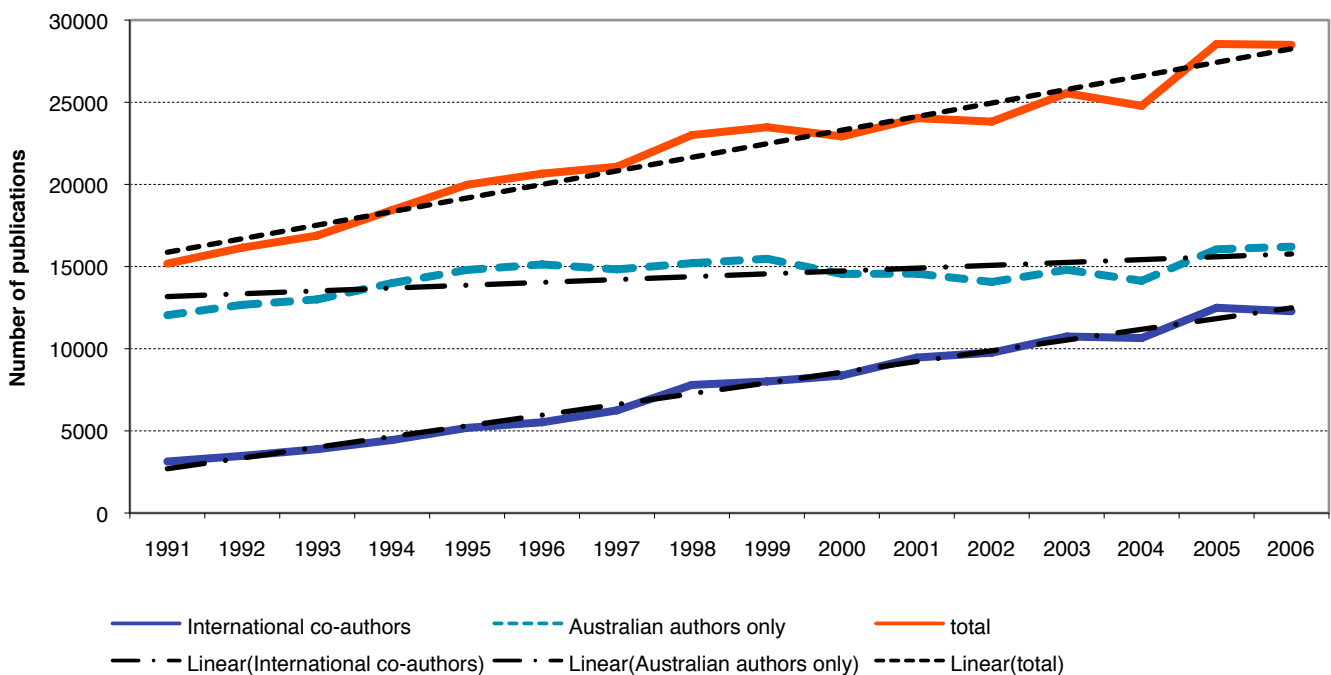
The remainder of this submission addresses the specific issues raised in the Terms of Reference and concludes by recommending that the Australian Government establish an International Bureau designed to facilitate Australia's transition to becoming an active and effective player in

the new era of collective international research addressing global challenges.

Response to Terms of Reference

The nature and extent of existing international research collaborations

- International collaboration is an important and pervasive aspect of Australia's academic research – especially in the natural sciences. Indeed, the bulk of the increase in the output of Australian research publications is associated with international collaboration. This can be seen in the graph below.
- International collaboration allows important synergies between expertise, geographical circumstances and research facilities/instruments to be exploited – in so doing increasing the rate of progress made in research and the more timely diffusion of the eventual benefits arising from this research.
- Many analyses and policy stances treat international competitiveness in research as the simple product of national capabilities – reinforcing overly nation-centric views of how cutting edge research is carried out. This is reflected in the notion of 'national innovation systems'.
- In contrast, for many areas of scientific research it is preferable to move beyond national 'silo' based



Source: Thomson Reuters Science Citation Index, 1991–2005.

thinking. We should approach competitiveness in research as the product of competencies generated by international teams that may be greater than the sum of the constituent 'national' parts. In these cases, the international research team is itself the 'asset' – and will be associated with a string of advances in knowledge.

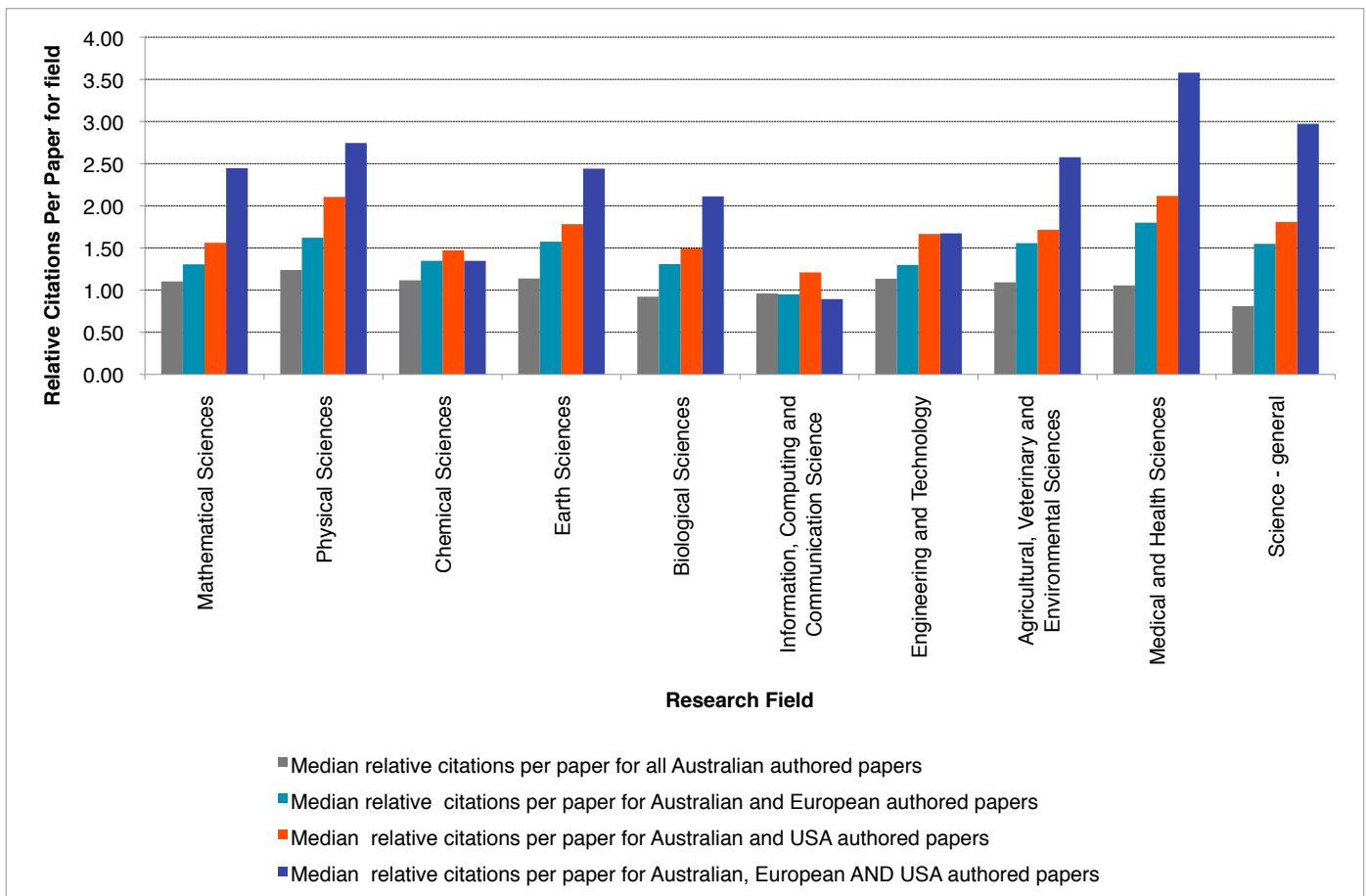
The benefits to Australia from engaging in international research collaborations

The benefits to Australia arise from the following aspects of international research collaboration:

- The credibility and international standing that arises from being seen to play an active and proportional role in international efforts to address major global challenges requiring research inputs. This, in turn, generates a wide range of diplomatic benefits consequent on not being seen as a 'free rider' in the international cooperative research system.
- Access to leading international research facilities and data sets that Australia does not possess, and in many cases would never be able to afford.
- Access to geographical circumstances that do not exist

in Australia (e.g. the northern skies).

- Exploiting scale and scope in research projects that are not possible with national projects alone.
- A lower incidence of duplication and waste in research efforts.
- Higher citation rates for published research. Internationally collaborative research tends to be more highly cited than research with no international collaboration. Furthermore, multilateral collaboration is associated with a higher 'citation impact multiplier' than bilateral collaboration. This can be grasped in the graph below, which shows how relative citation impact (citations per paper divided by the world average) is affected by both bilateral and multilateral collaboration. In all fields of research, bilateral collaboration with USA based researchers has a greater impact on citation performance than collaboration with Europe-based researchers. This reflects the notable strength of the US in English language research.
- The drivers of these citation impact multipliers are complex, and are driven in part by 'outlier' cases of unusually large projects with multiple authors in several countries accessing unique research facilities.



Source: Thomson Reuters Science Citation Index Publications by Major Research Fields, 1991–2005.

However, such cases are now a distinctive feature of citation performance in the natural sciences.

- As regards the social sciences, international collaboration is less prevalent than in the natural sciences. However, the same broad pattern in which collaboration with USA based researchers has a stronger impact on citation performance than collaboration with European researchers is maintained.

The key drivers of international research collaboration at the government, institutional and researcher levels

See points immediately above.

The impediments faced by Australian researchers when initiating and participating in international research collaboration and practical measures for addressing these

The major impediments are:

- Restrictions on the use of core domestic research funding to support international collaboration (e.g. cutting the travel component in domestic research grants). This impediment has been becoming less severe as policy makers recognise the importance of international collaboration to 'national' research efforts.
- The availability of targeted funding to support the additional transaction costs required to support international collaboration that leverages existing core domestic research funding.

Principles and strategies for supporting international research engagement

The following policy principles could be used to support effective international engagement in research.

- *Self-reliance*: policy makers should encourage researchers to treat international collaboration as part of the core business of research by adopting a permissive stance over how core research funds are spent and avoiding restricting expenditure to within-

country uses. The emphasis should be on achieving useful progress in research with sufficient leeway provided for researchers to build effective international partnerships in order to do this. The self-reliant approach allows (substantial) core domestic research funding to be leveraged via international collaboration. This is preferable to treating international engagement as an 'optional extra' to domestic research efforts. The R&D Tax Credit is an under-used mechanism for pursuing self-reliant approaches. This is because it allows businesses to claim the tax credit for work contracted out to universities and research agencies, in so doing, creating the potential for these public-private partnerships to resource international cooperative research via reciprocity arrangements. See the discussion of the SIRICA concept in Matthews, M. (2008).

- *Agility*: policy makers should recognise that researchers following the self-reliant approach will need to build new and sometimes unanticipated collaborative relationships when research projects are underway. Sufficient leeway in funding guidelines should exist to allow for such agility (i.e. flexible and timely means for adding new collaborative arrangements to existing research projects).
- *Distinctiveness*: the way in which Compact-based funding arrangements evolve should ideally encourage universities to adopt diverse and distinctive strategies as regards international engagement. Compacts would provide an effective mechanism for fostering self-reliance and agility in the conduct of international research collaboration.
- *Support for the additional transaction costs required to support international engagement*: the self-reliant approach can still require small amounts of supplementary funding to cover the additional transaction costs associated with international engagement - necessary to leverage core research funding via international collaboration. Such funding needs to be agile in order to allow Australian researchers to respond to unforeseen opportunities in a timely manner. Compact-based funding

	Country Y Capability Index > 1.0	Country Y Capability Index < 1.0
Country X Capability Index > 1.0	X: Forge-ahead opportunity Y: Forge-ahead opportunity	X: Pull-down risk Y: Pull-up opportunity
Country X Capability Index < 1.0	X: Pull-up opportunity Y: Pull-down risk	X: Catch-up opportunity Y: Catch-up opportunity

arrangements provide a useful mechanism for supporting these additional transaction costs in an agile manner.

Analytical work carried out by FEAST, see the Discussion Papers in Matthews, M., *et al.* (2009) (1) and Matthews, M., *et al.* (2009) (2), has highlighted the importance of examining strategies for international engagement on the basis of the potential to be 'pulled-up' by more capable partners and to be 'pulled-down' by less capable partners. The principles are expressed in the matrix on the preceding page, and Matthews, M., *et al.* (2009) (2) contains data populating this matrix (in the context of the Australia-Europe relationship).

From this perspective, Australia chooses to place a high proportion of its support for bilateral research cooperation into the 'pull-down' quadrant – for reasons other than research per se. Whilst funding bilateral research cooperation for other aims is useful, it can be problematic if too great a proportion of the overall budget is diverted away from the 'pull-up' opportunities associated with cooperation with Europe, the USA, Japan and other advanced nations.

Conclusion

This submission has highlighted the need for Australia to:

- de-couple innovation policy (primarily a national competitiveness and productivity concern) from research policy – framed as primarily a collective international activity;
- avoid the 'double whammy' risk of becoming isolated in the mainstream of collective international research activity by being unable to demonstrate good global citizenship whilst also needing to operate with the reduced levels of access to the pre-publication research findings, pertinent to governments, that arise from collective international research;
- move as rapidly as possible to a policy stance able to deliver on the levels of openness and reciprocity in research that are necessary in order to play a significant role in the emerging international research order.

Achieving this significant change in the policy stance, with the requisite levels of enhanced inter-Departmental coordination and international relationship management, is a non-trivial objective. FEAST therefore recommends that the Australian Government consider establishing an

International Bureau tasked with providing this whole-of-government capability.

A whole-of-government approach is necessitated by:

- the complexities of facilitating international engagement in research involving several nations and transcending a range of research fields and objectives;
- the diplomatically important imperative to ensure that Australia's system of research funding achieves levels of openness and reciprocity necessary to operate effectively in the modern global research order;
- the importance of developing robust evidence-based priorities for the nation's international research engagement strategy.

In regard to this last point, given the rise of a number of new nations in the global research order (including in South America, and Asia in general) it is essential that Australia moves beyond the reactive emphasis on putting a large proportion of bilateral support into cooperation with China and India (as most other nations are) and towards a more pro-active and diverse strategy aimed at engaging effectively with a number of significant research-performing nations (developed and developing). A window of opportunity still exists to rectify the imbalance in Australia's policy stance here – but time is running out.

Australia's International Bureau could be modeled on the successful International Bureau established by the German Federal Ministry of Education and Research (who are coordinating a project involving FEAST and CSIRO – in so doing establishing an effective working relationship). FEAST and CSIRO's government and international relations teams are well positioned to assist the Australian Government in designing and developing such a unit. The close involvement of DFAT would be an essential condition of success for such a unit.

References

- Matthews, M. (2009). *Giving Preparedness a Central Role in Science and Innovation Policy*. FASTS Policy Discussion paper.
<http://www.fast.org/images/news2009/preparedness%20nov%2009.pdf>
- Matthews, M. (2008). *Standard International Research and Innovation Cooperation Agreements (SIRICAs)*. A Proposal from the Forum for European–Australian Science and Technology cooperation (FEAST).
<http://www.feast.org/index/document/62>
- Matthews, M., Biglia, B., Henadeera, K., Desvignes–Hicks, J.–F., Faletic, R., Wenzholz, O. (2009) (1). *A Bibliometric Analysis of Australia's International Research Collaboration in Science and Technology: Analytical Methods and Initial Findings*. FEAST Discussion Paper 1/09.
<http://www.feast.org/index/document/1>
- Matthews, M., Biglia, B., Murphy, B. (2009) (2). *A comparison of Australian and European Union research performance profiles*. FEAST Discussions Paper 2/09.
<http://www.feast.org/index/document/2>