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Universities Australia Submission to the
House of Representatives Industry, Science and
Innovation Committee Inquiry into
Australia's International Research Engagement

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Contents

1.	Executive Summary	2
2.	Introduction	3
3.	The internationalisation of Australian universities.....	3
4.	The extent of existing international research collaborations (TOR 1)	4
5.	The benefits to Australia from engaging in international research collaborations (TOR 2).....	7
6.	The key drivers of international research collaboration at the government, institutional and researcher levels (TOR 3).....	8
7.	The impediments faced by Australian researchers when initiating and participating in international research collaboration and practical measures for addressing these (TOR 4)	9
8.	Principles and strategies for supporting international research engagement (TOR 5).....	10
9.	Conclusion	11

I. Executive Summary

In 2009, Universities Australia produced a report, *The Nature of International Education in Australian Universities and its Benefits*¹, which covered the many economic and non-economic benefits of international engagement. OECD data found that 19.7% of undergraduate students, and 19.1% of postgraduate research students, in Australian universities in 2006 were international students. The Department of Education, Employment and Work Relations 2007 finance data showed that Australian universities earned \$2.6 billion from international student fees, making education the third largest industry, which generates 126,240 jobs. Beyond economics, the ability of Australian researchers to collaborate internationally in order to resolve some of Australia's most pressing issues is immeasurably important. The ability to access world-class infrastructure and researchers reduces double spending and develops Australian research standards, respectively. Furthermore, by educating the best and brightest international students, such as ANU graduate and Indonesian Minister for Trade, Mari Pangestu, international collaboration encourages greater cooperation between nations.

The lack of funding available to Australian researchers and proximity to international collaborators creates an artificial barrier to possible research collaborations. Bureaucratic issues with visas and geographic isolation are further real barriers to successful international research engagement. The Australian government has taken a number of important initial steps to develop Australia's international engagement in research and this inquiry provides an excellent opportunity to develop a more strategic and coordinated approach to Australia's involvement in international research collaborations. Australian researchers need to be able to access the greatest minds overseas, but also entice those same researchers to Australia in order to collaborate on issues of national importance.

Universities Australia makes the following recommendations in support of enhanced international research engagement by Australia:

1. An increase in funding for basic (Australian Research Council) research of at least \$100 million per annum, to arrest the current decline in grant success rates and enable Australia to retain the fundamental research capacity on which international collaboration is based.
2. Introduction of an ongoing mechanism for facilitating funding of landmark (\$100 million dollar plus) international collaborative projects such as the Square Kilometre Array telescope.
3. Restoration of the priority in the skilled migration program given to international students graduating from higher degrees by research.
4. Expansion of the value and number of International Postgraduate Research Scholarships to enable universities to attract the best international research students.
5. A new grant program to support enhanced academic exchange by university faculty and shared supervision of higher degree by research students.
6. Creation of a second phase for the National Collaborative Research Infrastructure Scheme past its current 2011 funding date to ensure adequate infrastructure in key priority areas.
7. Establishment of a grants program within AusAID to promote organisational capacity building of collaborative research partners in developing countries in the Asia-Pacific region.
8. An early review of the funding adequacy and support model provided by the Commercialisation Australia initiative to ensure that potential commercial products developed through international collaboration have a clear path to market.

¹ Universities Australia, *The Nature of International Education in Australian Universities and its Benefits*, September 2009

2. Introduction

Universities Australia is the peak organisation representing Australia's 39 universities in the public interest both nationally and internationally. Universities Australia welcomes the opportunity to provide a submission to the House of Representatives Industry, Science and Innovation Committee Inquiry into Australia's International Research Engagement ('the Inquiry').

The terms of reference (TOR) provided to this House of Representatives Committee are to enquire into:

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

Universities in Australia are an \$18 billion sector, with one million students and 100,000 employees. Compared with overseas peers, Australia's research effort is overwhelmingly concentrated in universities, with this sector being amongst the most globalised and technologically sophisticated of all Australian industries. The Cutler Review of the national innovation system referred to universities as 'Australia's engine room for discovery and invention and the principal creators and disseminators of new knowledge'.² Internationally, Australia's universities have a reputation for quality. The Lisbon Council in a year long project ranking national university systems³, found Australia to have the best university system in the world.

3. The internationalisation of Australian universities

The internationalisation of Australia's universities has played out over the last half century in three stages. In 1950, a meeting of Commonwealth foreign ministers in Colombo recommended the creation of a scheme under which bilateral aid could flow to developing countries in South and Southeast Asia (the 'Colombo Plan'). Australia's universities then opened their doors to thousands of Colombo Plan students. This period of aid based delivery of education is characterised as the first wave of internationalisation.

With the passing of legislation in the mid 1980s allowing the enrolment of full fee international students, universities moved from a sole focus on aid to include a heavy focus on trade as well. While the number of overseas fee-paying students has grown exponentially since this time, many students continue to come to Australia to study on a variety of scholarships. The twenty-five years of this period of internationalisation has seen education become one of Australia's largest exports and a significant source of revenue (on average 15%)⁴ for universities.

² Terry Cutler, *venturousaustralia: building strength in innovation*, 2008, p. 67.

³ Lisbon Council, *University Systems Rankings: Citizens and Society in the Age of Knowledge*, 2009.

⁴ Stephen Connelly, 'Lessons from the Past', *Campus Review*, 3 August 2009.

Universities Australia considers that universities are now on the cusp of a third wave of internationalisation. This involves the development of engagement strategies that enable universities to fully engage in a global knowledge economy. This third phase will continue to involve the education of international students both in Australia and offshore. However, there will be a strong focus on increasing the proportion of high quality international higher degree research students through the extension of scholarships and promotion of the quality education system available to such students.

This phase will also be characterised by greater levels of collaboration in international research with partner universities, research institutions and governments offshore. It will be a period of enhanced academic to academic research collaboration as well as participation in 'landmark' projects such as the Square Kilometre Array Telescope. This greater collaboration will also be seen in the efforts by universities to assist in regional development through partnership with regional universities and research institutions to develop their own capacity to participate in collaborative international research.

Universities Australia considers that the Inquiry presents a timely opportunity to enhance these processes in support of Australia's national interest and of a prosperous and interconnected region. This submission addresses each of the five discussion questions identified in the Inquiry's terms of reference, with a summary of recommendations set out below.

4. The extent of existing international research collaborations (TOR 1)

Australia has a long established record of strong performance against international peers in conventional measures of research output. Scientific output has progressively increased and Australia's index of citation impact is at an all time high at 1.08 times the world average.⁵ In 2004, Australia accounted for 2.891 per cent of world research publications and ranked 9th among OECD countries. Australian triadic patents (USA, Japan & Europe) have risen steadily since the mid 1980s, up to 0.82% of the world total in 2003 (ranked 14 in the world). Compared with OECD peers, these outcomes are overwhelmingly driven by universities and public research institutions rather than private research.

However, Australia is a small country with a relatively modest investment in research and development. The Productivity Commission's 2007 study of investment in research found that both public and private investment had fallen behind competitor nations, with business expenditure of research and development only half the OECD average.⁶ In these circumstances, the ability to leverage the best international minds and infrastructure to the benefit of Australia's research output is vital.

Recommendation 1: An increase in funding for basic (Australian Research Council) research of at least \$100 million per annum, to arrest the current decline in grant success rates and enable Australia to retain the fundamental research capacity on which international collaboration is based.

For many decades, Australian universities have built collaborations with international researchers and research institutions. The Anglo-Australian Observatory is a well known example of such long standing collaboration. However, with the increasing complexity of major research challenges and the

⁵ Thomson ISI, *National Science Indicators Database*, 2006.

⁶ Productivity Commission, *Public Support for Science and Innovation*, 2007.

globalisation of knowledge generation, such collaborations have grown significantly in recent years with the recognition of the importance for Australian university researchers of being able to collaborate with other national research leaders and work with cutting edge technology.

There are two separate but related aspects to such international research engagement. One is the person-to-person connections between academics (and with research students), on both informal and formal levels, leading to the mutual sharing of knowledge and expertise and sometimes to joint projects. The second aspect is Australia's participation in major international research undertakings requiring the sharing of infrastructure, costs and research capacity across nations. Both aspects are valuable and need to be nurtured by supportive policy settings, which is the subject of discussion later in this paper.

In relation to formal, large scale research collaborations, Australian universities are a part of numerous multi-million dollar collaborations to access the world's leading technological facilities, such as the Large Hadron Collider and the Hubble Space Telescope. Many new collaborations have come from India and China, while historically, the United States of America, Canada and Europe have been the chief source of collaborations.

Recommendation 2: Introduction of an ongoing mechanism for facilitating funding of landmark (\$100 million dollar plus) international collaborative projects such as the Square Kilometre Array telescope.

While astronomy has been, and remains, a key source of large international research collaborations for Australia, health, biological and environmental sciences, advanced materials and photonics are growing areas of collaboration, for example:

- Monash University's collaboration with University of Nebraska, Swiss Tropical Institute, London School of Hygiene and Tropical Medicine, University of Texas, and the University of Washington to study the effect of medicines for malaria.
- The University of New England's *Toward Cancer Cures* project with the University of California, University of Pittsburgh, University of Queensland, and the University of Southern Denmark.
- The University of Queensland's *Engineering Bio-inspired Materials* project with Oxford, Cambridge and Colorado Universities and the US National Institute of Standards.
- The University of Adelaide collaboration with Beijing University on pollution control through the capture of fine particle emissions and gaseous pollutants by sorbents.
- Swinburne University of Technology's *Multi-dimensional optical data storage based on nanophotonics* project with Oxford and Osaka Universities.
- The University of South Australia's collaboration with the Centre for Eye Research Australia, the Bernard O'Brien Institute for Microsurgery and the L V Prasad Eye Institute, India on *An Advanced Surface for the Cell Therapy of Limbal Epithelium for Ocular Surface Disease*.

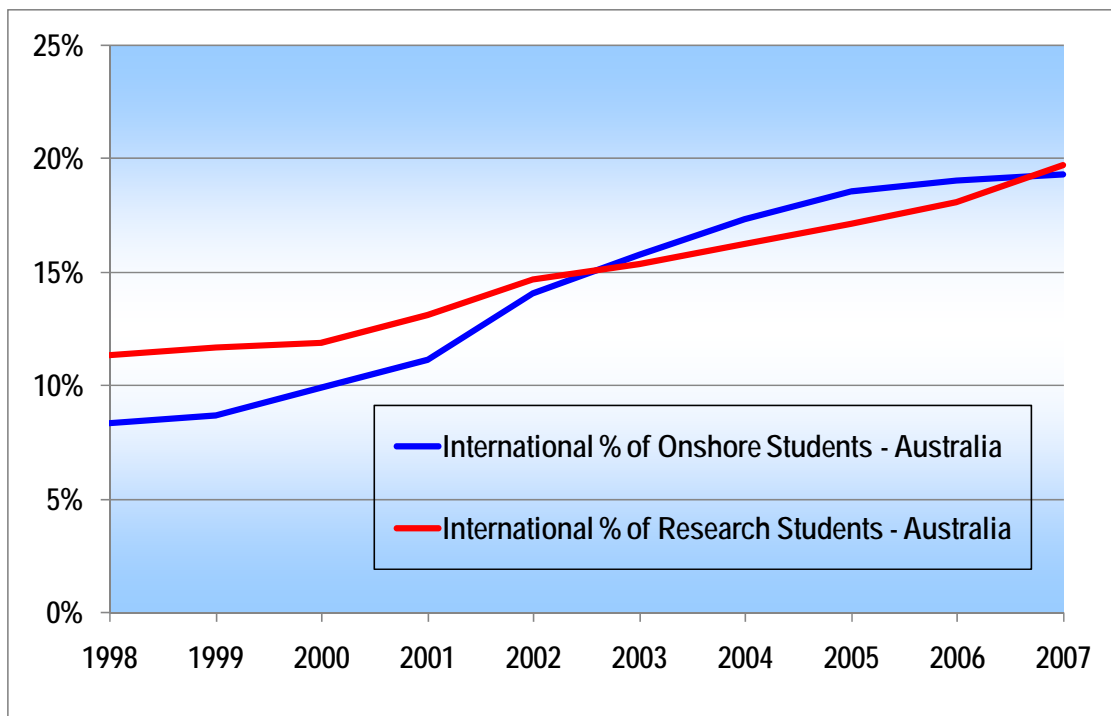
Another important aspect of the internationalisation of Australian research has been the attracting of quality research students to Australia. This provides Australia with access to some of the world's best young minds, many of whom will stay in Australia to work following completion of their studies, or who return overseas to form part of a valuable network of Australian-trained researchers.

Over the nine years 1998 to 2007, numbers of international postgraduate research students in Australian universities grew, on average, 10 per cent per year. In 1998, 4,047 international

postgraduate research students made up 11.4 per cent of Australia's 35,577 postgraduate research students. In 2007 the number of international postgraduate research students had more than doubled to 9,836, making up 19.7 per cent of Australia's 49,819 postgraduate research students⁷.

Recommendation 3: Restoration of the priority in the skilled migration program given to international students graduating from higher degrees by research.

Chart I.1 Proportions of International Students and International Research Students



In **Chart I.1 Proportions of International Students and International Research Students**, above, the proportion of postgraduate research students who are international grew to 19.7 per cent in 2007, at the same time as the proportion of onshore students in Australian universities who are international grew from 8.3 per cent to 19.4 per cent. The Australian experience shows that it is possible to grow a mass undergraduate international student program at the same time as an international postgraduate research student program. They are not mutually exclusive.

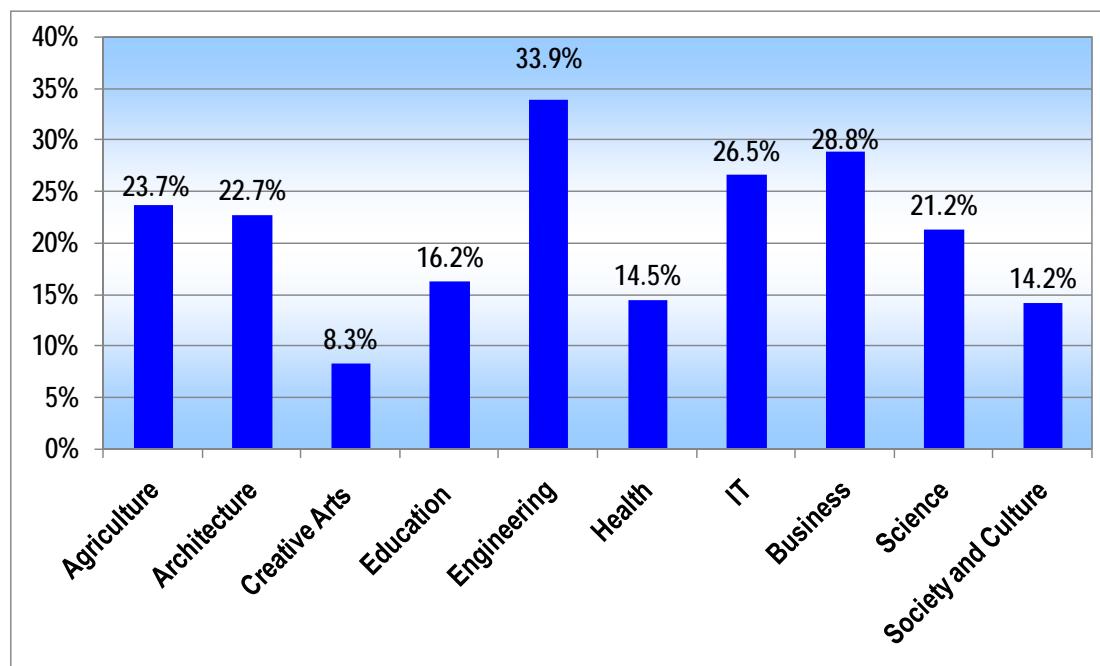
The market for international research students (and particularly for the top students) is highly competitive. Australia's enrolment of international research students is the above the OECD average of 15.9 per cent of total enrolment, but well behind leading nations such as Switzerland, the UK and the US. There is also anecdotal evidence that many elite students do not look to Australia as their first choice destination, but look to the prestigious 'name' universities in the USA and UK. Some suggested ways to enhance Australia's performance in this important area are provided later in this paper.

Recommendation 4: Expansion of the value and number of International Postgraduate Research Scholarships to enable universities to attract the best international research students.

⁷ Department of Education, Employment and Workplace Relations, *Selected Higher Education Statistics: Students*, 2008.

The representation of international students varies significantly by research fields as shown in **Chart I.2 Proportion of International Research Students by Field of Research**⁸.

Chart I.2 Proportion of International Research Students by Field of Research 2007



This shows a high concentration of international research students in Engineering, Business and IT. However, as a comparison, in the UK, international students make up 59% of research students in Law, 58% in Engineering and Technology, 58% in Business and Management, 53% in Social Studies and 51% in Mathematics and Computing⁹. In the US, the Survey of Earned Doctorates, quoted by Kemp et al, suggests that, in 2006, the proportion of doctorates awarded to international students was 33%, including 67% of Engineering doctorates and 53% of Physical Sciences doctorates.

Recommendation 5: A new grants program to support enhanced academic exchange by university faculty and shared supervision of higher degree by research students.

5. The benefits to Australia from engaging in international research collaborations (TOR 2)

Given Australia's size and its modest historical investment in research and development, effective engagement with international research efforts is essential for Australia's future productivity and also for the vitality of its higher education and research institutions. Otherwise Australia will become increasingly isolated from the currents of new ideas circulating within the global knowledge system. As the Cutler Review of the Australia's innovation system stated:

⁸ Department of Education, Employment and Workplace Relations, *Selected Higher Education Statistics: Students*, 2008.

⁹ N. Kemp, W. Archer, C. Gilligan and C. Humfrey, *The UK's competitive advantage: the market for international research students*, HE International Unit, 2008.

Australia's share of world R&D expenditure is small at 1.3 percent as is our share of new knowledge and innovation each year at approximately 2 percent. While this is a credible performance it means that 98 percent is created elsewhere and it is essential that we are able to access it or risk being overtaken by those that do. The quality of the 2 percent that we produce and its usefulness to the rest of the world will be important determinants in our ability to access the other 98 percent. [...] Without contributions to the rest of the world from its own science base and without strong international linkages to keep in touch with developments at the leading edge of research and technology, Australia runs the risk of becoming a technological 'price taker'.¹⁰

Cutler goes on to argue that we are increasingly in a world where talent is globally mobile, supply chains disaggregated and cutting edge research 'requires facilities and intellectual resources beyond the scope of most countries, and in particular a relatively small country like Australia'.¹¹ In this environment, Australia must leverage its expertise in certain areas (e.g. health sciences, environmental and resource engineering, advanced materials, the political economy of the Asia Pacific region) to maintain a seat at the top table of collaborative knowledge generation and dissemination. With the participation of universities in Cooperative Research Centres and other mechanisms, much of this research can then be commercialised for the long-term benefit of the Australian economy.

Through participation in international collaborations on both small and large scales, Australia's universities are able to support the national interest through more and better basic and applied research outputs, research-led teaching and the training of the next generation of researchers. International collaborations give Australian researchers and research students access to the world's best minds and cutting-edge facilities not available in Australia. Using established international facilities can also be a more cost-effective use of funding than duplicating those facilities in Australia (which in many cases would be financially impossible).

International engagement provides access to larger and more diverse sources of funding. The comparatively limited funding available to Australian researchers makes access to international funding an important driver of Australia's research capacity. Furthermore, certain fields of research are not a priority in Australia or do not have the critical mass to be significantly funded. By engaging in international collaborations, Australian researchers are able to work with overseas experts in fields that do not get much recognition in Australia, and so maintain a degree of expertise within Australia that could be scaled up should those fields increase in prominence in future.

6. The key drivers of international research collaboration at the government, institutional and researcher levels (TOR 3)

Australia's universities will always seek out international collaborations that align with their strategic objectives and add value to their own research and research training efforts. The extent of these collaborations will depend on the focus of the university, the international environment for research in its fields of research strength, avenues for funding collaborative activities, and the effect of public policy settings such as visa requirements.

Other things being equal, universities will pursue international collaborations where:

- there are compatible universities, research institutions, private companies or other bodies with similar research questions needing to be addressed;

¹⁰ Cutler, *venturousaustralia*, pp. 20-21.

¹¹ Cutler, *venturousaustralia*, p. 21

- there is an obvious research benefit from sharing expertise, costs and/or infrastructure;
- research units are willing and able to invest the significant time and effort required to establish and maintain productive collaborations;
- sufficient funding is available to offset the costs of collaboration;
- the collaborations would contribute to the broader development of research capacity and research networks within the institution and within our region; and
- the potential collaboration would have reputational or other spin-off benefits.

At the researcher level, drivers of international collaborations can be more narrowly focussed, and understandably so. Researchers are usually time poor and engage in collaborations if there is some clear benefit to their research and ultimately their career. In this respect, the significant amount of 'red tape' involved in many collaborations and the long term nature of any rewards can be significant deterrents. On the other hand, researchers may be drawn to international collaborations where they offer the opportunity to work with the best minds and infrastructure in the world wherever they are found, and have the potential to generate significant original published research and new research networks.

7. The impediments faced by Australian researchers when initiating and participating in international research collaboration and practical measures for addressing these (TOR 4)

Some of the impediments to international research collaboration relate to Australia's small size and geographic isolation, and so are not easy to address, although continued investment in transport and communications infrastructure can help mitigate their effects. The lack of international air capacity into Adelaide, for example, has been a significant impediment to its planned development as a significant regional higher education and research hub.

The impediments that are within the control of the Australian Government fall broadly into the categories of funding arrangements, facilitation/promotion and broader regulatory settings. The most significant impediment is the extremely low level of funding for the premiere Australian Research Council Discovery Program, which has seen grant success rates fall to around 20 per cent. This not only diminishes the capacity of Australian institutions to bring significant new research to the table, but it directly impinges on international collaboration as international travel and related activity within projects is often excessively trimmed to fit within the current restrictive funding envelope.

Similarly, funding of research infrastructure has been through an extended lean period, and it is vital that initiatives such as the National Collaborative Research Infrastructure scheme and the Education Investment Fund continue to make sufficient funds available for investment in priority areas. The research community has been greatly heartened by the Government's support for the proposed Square Kilometre Array telescope, and Universities Australia proposes that a standing mechanism be established within the Research Minister's portfolio to facilitate Australian engagement with landmark project of this kind.

Recommendation 6: Creation of a second phase for the National Collaborative Research Infrastructure Scheme past its current 2011 funding date to ensure adequate infrastructure in key priority areas.

Training of the world's best young researchers in Australian universities is an essential part of our future participation in international research collaboration. The main program for attracting these students is the International Postgraduate Research Scholarships Scheme, however this too is seriously undefended for its purpose, which was acknowledged in both the Cutler Review and the Bradley Review of Australian Higher Education. Recent unnecessary changes to the priority given to international research students seeking to obtain Australian residency have also has a negative effect on our attractiveness as a destination for research training and may also impact negatively on the much needed renewal of Australia's academic workforce.

In addition to the funding of specific collaborative research, there is an important role for the broader facilitation of collaborative networks. For example, the support provided by the Forum for European-Australian Science and Technology cooperation (FEAST) has been excellent in establishing collaborations with European researchers and institutions over the years. There is a strong case for government to invest in a new program to support enhanced academic exchange by university faculty (and shared supervision of higher degree by research students) with an initial focus on North America and Asia.

8. Principles and strategies for supporting international research engagement (TOR 5)

International research engagement is an essential aspect of Australia's research and innovation performance. Such engagement however, should remain aligned with our broader priorities for knowledge generation and economic development. Funding support should be transparent and appropriate to the intended outcomes. Regulation should be fit for purpose but not unnecessarily burdensome.

The preceding section outlined a number of areas in which practical and affordable changes to policy settings could enhance our performance in this field. These involve changes to current funding arrangements, facilitation/promotion support and broader regulatory settings. Beyond this, government should consider the relationship between international research collaboration and wider policy objectives.

In this regard, Universities Australia would highlight two issues. Firstly, enhancing the research capacity of Australia's developing country neighbours should be an important element of our overall aid and development programs with these neighbours, and would also be strongly in Australia's own long term national interest. Although such support does occur through AusAID at present, this is on a limited and essentially ad hoc basis, and should be given focus through the creation of a specific program within AusAID to promote organisational capacity building of research partners in collaboration with Australian institutions.

Recommendation 7: Establishment of a grants program within AusAID to promote organisational capacity building of collaborative research partners in developing countries in the Asia-Pacific region.

Secondly, the ability to leverage international research collaboration to Australia's national economic benefit depends in large part on the efficacy of our research commercialisation arrangements. There was significant concern in Australia's research community around the abolition of the 'Commercial Ready' scheme, and considerable expectations now ride on the significantly less well funded Commercialisation Australia initiative. Given the importance of this issue, Universities Australia

recommends an early review of the funding adequacy and support model provided by the Commercialisation Australia initiative to ensure that potential commercial products developed through international collaboration have a clear path to market.

Recommendation 8: An early review of the funding adequacy and support model provided by the Commercialisation Australia initiative to ensure that potential commercial products developed through international collaboration have a clear path to market.

9. Conclusion

Australian research has long enjoyed an international status of producing excellent researchers out of proportion with our small size. Through the work of these researchers, Australia has continued to expand the international connections that will be vital to our social and economic future. However, in a highly competitive world, there are important steps that should now be taken to build on these efforts.

Universities Australia welcomes Senator the Hon. Kim Carr's proactive decision to hold an inquiry into a matter of deep importance to the future success of Australian research, and we commend the recommendations in this submission to the Inquiry.

Universities Australia would welcome the opportunity to appear before the Inquiry or to provide further information on the issues raised in the submission. Please contact Dr Glenn Withers AO, Chief Executive Officer on 02 62858104 or email glenn.withers@universitiesaustralia.edu.au