UNIVERSITIES AUSTRALIA

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Submission to the House of Representatives Standing Committee on Industry, Science and Innovation

Inquiry into research training and research workforce issues in Australian universities

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Executive Summary

Research training is a key activity for Australia's universities. A quality offering of higher degrees by research and postdoctoral fellowships is increasingly vital to the sector's future in a context where large numbers of academic staff are approaching retirement age, and where universities must increasingly compete for the best graduates with attractive government and private sector offerings.

Research training is also a leading driver of innovation and national economic performance. Research students and early career researchers undertake some of the most enterprising work done in Australian universities across a wide range of disciplines, as well as gaining the skills to take on senior positions in the university sector, in research institutes and in public and private sector management.

Australia retains a strong reputation for producing world leading researchers. Australia's scientific output is at an all time high, with Australia ranked 9th in the OECD by number of research publications. Over the past decade, the number of domestic research degree enrolments has increased from 29,331 in 1996 to 40,486 in 2006, while the number of international enrolments has grown even more strongly from 4,049 to 8,981 over the same period.

At the same time, the long-term erosion of public funding for universities has had a significant effect on research training. For example, the increase in the student to staff ratio from 12:1 in 1990 to 20:1 in 2006 has made it much more difficult to offer quality supervision to research degree candidates. Increasingly run down university infrastructure has also made attracting and retaining bright young researchers difficult when our international competitors are rapidly increasing investment in universities. The poor availability and low level of income support for research students has further detracted from research training by forcing research candidates to work long hours in paid employment.

Universities Australia makes the following recommendations in relation to future arrangements for research training in Australia:

- Increase the number of entry level research fellowships (Level A/B), at a competitive salary level, to retain a higher number of the best research degree graduates in the university sector.
- Support the work of the university sector to attract and support greater numbers of people from equity groups to pursue research degrees and careers in research.
- Increase the targeting of high-end international research degree students, including by making more international scholarships available and by making it easier for AusAID-funded Masters students to progress to PhD study in Australia.
- Restore indexation of university teaching and research grants to allow appropriate staff time and infrastructure to be devoted to research training.
- Alter the formula for research grants to fund the full cost of research, so that success in gaining grant funding does not come at the expense of a further running down of infrastructure.
- Ensure that sufficient funding is available to universities through the Education Investment Fund and the National Collaborative Research Infrastructure Scheme to fund world class research infrastructure and so attract the world's best research degree candidates.
- Create a separate funding arrangement for 'landmark' ($100m+) international research facilities.
- Increase the Australian Postgraduate Award stipend (which will fall below the poverty line this year) to $26,000 per annum.
- Promote collaborative approaches to research training such as research internships with industry for research degree students.

1. Introduction

Universities Australia was formed out of the Australian Vice-Chancellors' Committee on 22 May 2007 as the peak industry body representing 38 of Australia's universities. Universities Australia promotes the value and widespread benefits of higher education both nationally and internationally.

Universities Australia welcomes the opportunity to provide a submission to the House of Representatives Standing Committee on Industry, Science and Innovation *Inquiry into research training and research workforce issues in Australian universities* as announced on 30 April 2008.

Universities Australia understands the *Inquiry into research training and research workforce issues in Australian universities* is not only looking at the contribution that Australian universities make to Australian research training but it is also exploring the challenges those universities face in recruiting, training and retaining quality research staff.

Universities Australia believes this inquiry is timely and will contribute to the findings of the Review of the National Innovation System by demonstrating the key role Australian universities play in Australian research training and provide a natural bridge with the related Review of Higher Education.

As this submission will demonstrate, research training is a core aspect of the work of Australian universities, which have a distinguished history of producing world-leading researchers. A number of significant issues are now apparent in the current funding and management of research training in Australia, and in the available pathways from higher degrees into subsequent careers.

While this submission provides a representative voice across Australia's university sector, individual universities and specialised university groupings may also appropriately provide separate submissions to this inquiry emphasising matters of particular importance to them.

2. Inquiry Terms of Reference

Universities Australia notes that the referral by Senator the Hon. Kim Carr to the House of Representatives Standing Committee on Industry, Science and Innovation will involve inquiry into and reporting on Australian research training with particular reference to:

- the contribution of research training programs to Australia's competitiveness in the areas of science, research and innovation;
- the effectiveness of current Commonwealth research training schemes;
- the adequacy of current research training schemes to support Australia's anticipated future requirements for tertiary-qualified professionals in a wide range of disciplines;
- adequacy of training and support available to research graduate students in Australia;
- factors for graduates that determine pursuit of a career in research;
- opportunities for career advancement for research graduates and staff;
- factors determining pursuit of research opportunities overseas;
- Australia's ability to compete internationally for high quality researchers; and
- whether Australia's academic workforce is ageing, and its impact on research capacity.

3. The Role of Higher Education in Research Training

Universities in Australia are a $15 billion sector, with one million students and 100,000 employees. There are 39 universities, with the university sector being amongst the most globalised and technologically sophisticated of Australian industries. Australia's universities build international links that encourage trade, cultural understanding and regional security. They are the major contributor to the education services export sector, which has grown to be the third largest earner of export dollars for Australia (with only coal and iron ore earning more).[1]

Formal research training in Australia (primarily research degree study and postdoctoral research fellowships) is overwhelmingly undertaken by universities, in a small proportion of cases in partnership with public research bodies such as the CSIRO and with independent research institutes. University sector research training is therefore the bedrock upon which business, government, the community sector and universities themselves build Australia's performance in innovation and research. As public funding for research training generally does not cover the full cost of that training, this effectively represents a subsidy from other university activities to those sectors that benefit from university-trained researchers.

Over the past decade, the number of domestic research degree enrolments has increased significantly from 29,331 in 1996 to 40,486 in 2006.[2] International enrolments have grown even more strongly, from 4,049 in 1996 to 8,981 in 2006. However, the number of domestic research degree enrolments has reached a plateau over the last few years, at the time when Australia's skills needs have never been higher. Some of the causes for and possible solutions to this situation are discussed in the following section.

Universities have also had some modest success in increasing the participation of equity groups in research degrees. For example, the number of commencing Indigenous doctoral (PhD) students more than doubled from 2001 to 2006. At the same time, there has been little increase in the very low number of Australians from low socioeconomic status backgrounds or from regional Australia undertaking research degrees. This is one of the issues that may be addressed on the basis of information revealed in Universities Australia's recently released *Equity and Participation Action Plan* for the sector.[3] While the number of women entering research training remains strong, more needs to be done to retain women in research careers, particularly in the sciences and engineering.

Overall, Australia's researchers continue to perform strongly against international peers. Scientific output has increased over the years, and Australia's index of citation impact is at an all time high, currently 1.08 times the world average.[4] In 2004, Australia accounted for 2.891 per cent of world research publications and ranked 9th among OECD countries.[5] Australian triadic patents (USA, Japan and Europe) have risen steadily since the mid 1980s, up to 0.82 per cent of the world total in 2003

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1 Australian Bureau of Statistics trade data reveals that international education earns Australia $11.7 billion per annum, placing it ahead of tourism and far ahead of other service industries and traditional agricultural exports. Department of Foreign Affairs and Trade, *Trade Topics: A quarterly review of Australia's international trade*, Autumn 2008.

2 DEST, *Students: Selected Higher Education Student Statistics*, various years.

3 Universities Australia, Action Plan: *Advancing Equity and Participation in Australian Higher Education*, April 2008, http://www.universitiesaustralia.edu.au/documents/publications/policy/equity/ 0408_Equity_Particip_Action_Plan.pdf

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

5 Ibid.

(ranked 14 in the world).[6] Compared with OECD peers, these outcomes for Australia are overwhelmingly driven by universities and public research institutions rather than by private research.

Australia's research performance is nonetheless increasingly living off the past, with rapidly ageing university infrastructure combining with a 'baby boomer'-led research workforce now approaching retirement in unprecedented numbers.

While the number of research degree enrolments has been increasing, the growth in entry level academic positions (Level A/B) has not kept pace, meaning that many capable researchers choose to pursue careers internationally or leave the research field to take up more lucrative positions in the government and business sectors. Over the period 1996 to 2006, the number of Level A/B positions increased from 18,988 to 21,356,[7] a very small increase compared to the increase in undergraduate, research training, research and administrative workloads of universities. This in turn means that the opportunities for research in many junior academic positions are reduced, and the appeal of these positions to prospective high-calibre researchers is commensurately reduced. Declining academic salaries relative to general wage movements and reduced availability of facilities and other support only add to this effect.

Research from the Group of Eight Universities suggests that 50 per cent of PhD graduates from research intensive universities go on to careers outside the research sector.[8] While this can be seen as a positive outcome in terms of the skills that PhD graduates bring to a wide range of roles in public policy, business and other areas, it is of concern given the increasingly competitive international innovation environment and the likely mass retirement of 'baby boomer' researchers in the next decade. With the long timeframes involved in research training, and the difficulty of making mid-career transitions into research, early action to keep the best researchers working in their primary research field is highly desirable. The strong interest held by many research students for their subject matter means that many more PhD graduates may consider choosing to remain in the university sector if the number of entry level fellowships increased alongside improved salary and conditions for these positions relative to other career options. Appropriate professional development opportunities would be an important adjunct to increasing entry-level positions. The ability of universities to offer such choices should not continue to be distorted by the general under-funding of the higher education system.

4. Research Training and Australia's International Competitiveness

Top quality university research students and recent research graduates provide Australia with access to the latest available knowledge and play a key role in the translation, adaptation and adoption of new technical advances from around the world.

Universities Australia regularly highlights the fact that PhD students and early career researchers often undertake some of the most exciting work in our universities in their own right, as well as gaining the skills to drive Australia's future innovation and research performance. This quality and level of performance help to ensure that Australian business remains internationally competitive and that the Australian Government and Australian community organisations can better serve society.

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6 DEST, *Australian Science and Technology at a Glance*, 2006.

7 DEST, Staff Unit Record Files, 1996-2006.

8 Group of Eight, *Submission to the Review of the National Innovation System*, 2008, p. 50.

Australian university researchers and research students also provide the country with access to global knowledge networks, which is essential if we are to sustain high levels of productivity and international competitiveness. Increasingly, these young researchers are building bridges with institutions around the world – recent research has shown that such frequent movement of knowledge across borders is a major source of multi-factor productivity.[9]

An efficiently functioning university sector acts as a hub for the overall innovation system, fulfilling a number of innovation functions including:

- knowledge creation – from highly targeted and applied to exploratory;
- knowledge transfer from the public domain – through collaborative research, commercialisation activities, and informal national and international networks; and
- production of graduates, well-trained and skilled, and exposed to a wide range of educational, research and international ideas; and
- provision of repositories of innovative capacity – human capital, facilities, knowledge creation and transfer through research and teaching activities.

There are particular benefits to be gained for Australia from attracting high standard international students to undertake research training at Australian universities. Some of these students will remain in Australia to pursue research careers, providing a direct long-term benefit to Australia. Others will return to leading roles overseas, but will remain well-disposed towards Australia and will retain connections with many Australian colleagues. This process highlights Australia's rich tradition of integrating research, development and wider innovation activities across national borders, as well as promoting trade and foreign investment, and contributing to stable relations with countries in our region.

5. Current Support for Research and Research Training in Australia

5.1 Australia's research investment performance

While Australia's science and technology system is strong, it has failed to reach its full potential because of insufficient public and private investment. Gross Expenditure on Research & Development (GERD) as a percentage of Gross Domestic Product (GDP) is at 1.76 per cent, well below the OECD average of 2.26 per cent.[10]

As shown in Figure One, the government contribution to research funding has diminished considerably from 76.5 per cent in 1978-79 to just 41.4 per cent in 2004-05.[11] Industry financing of GERD as a percentage of GDP is also very low by OECD standards (Australia 0.91 per cent, OECD average 1.4 per cent, and Sweden, Finland and Japan in excess of 2 per cent).[12]

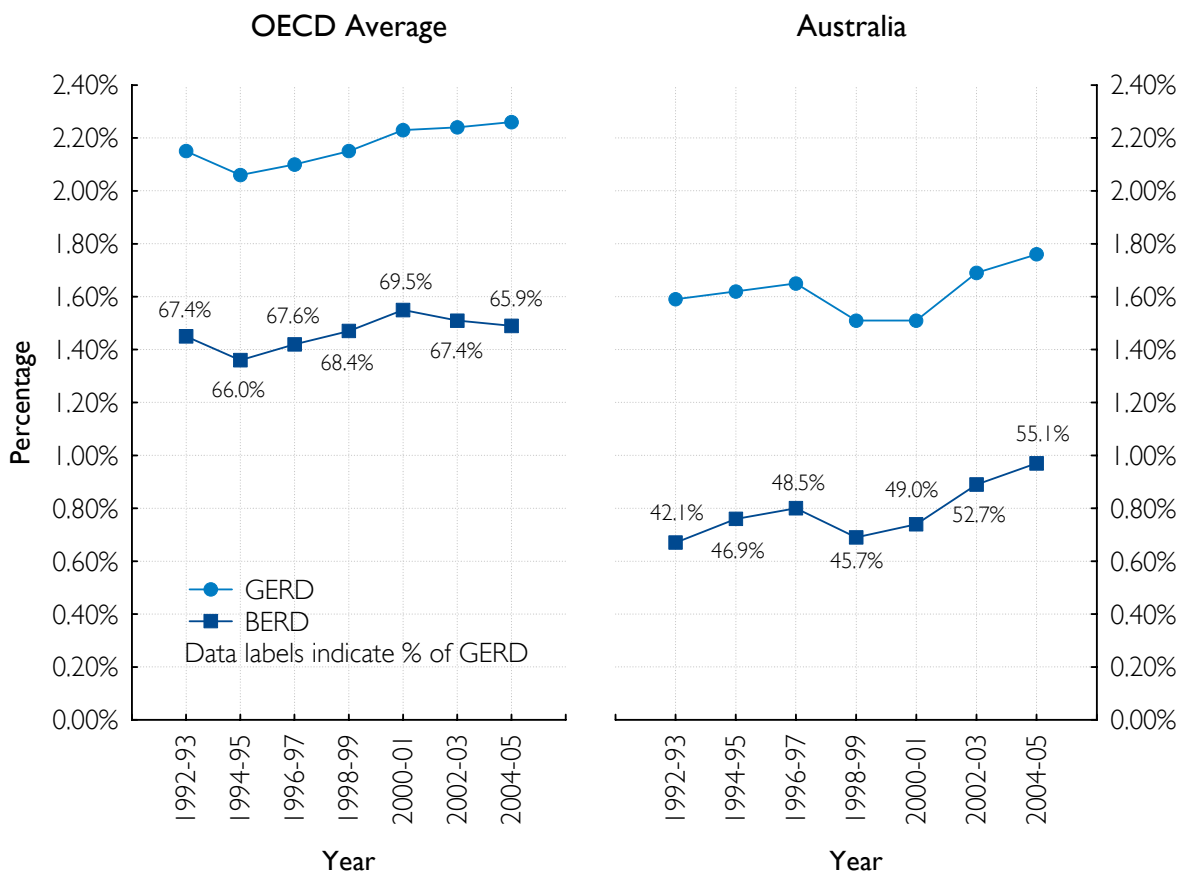
9 M.Tani, "Headcontent or Headcount? Short-term Skilled Labour Movements as a Source of Growth", *IZA Discussion Paper No. 1934*, January 2006.

10 ABS, *Research and Experimental Development All Sector Summary 2004-05*, cat no 8112.0

11 DEST, *Australian Science and Technology at a Glance*, 2006

12 OECD, *Main Science and Technology Indicators Database*, 2006

Figure 1: Comparison of Australia's GERD and BERD as a percentage of GDP with OECD Average



Sources: ABS *Research and Experimental Development, All Sector Summary* (8112.0) 1992-03 to 2004-05;
ABS *Research and Experimental Development, Business* (8104.0) 1992-03 to 2004-05;
Main Science and Technology Indicators Database: OECD 2007.2.

Business support for science and innovation in Australia is low compared to major competitor countries. A part explanation for this stagnant business outlay could be Australia's heavy reliance on the resources sector as an export staple without having a cohesive framework for other public and private investment in knowledge-based R&D and innovation.

Recent years have actually seen some welcome increase in business R&D as a share of GDP but this share remains well below the OECD average, let alone best practice. Along with a fairly constant public R&D share, this means our overall effort is still well short of even the average OECD benchmark. Figure 1 shows the trends.

5.2 Research block grants

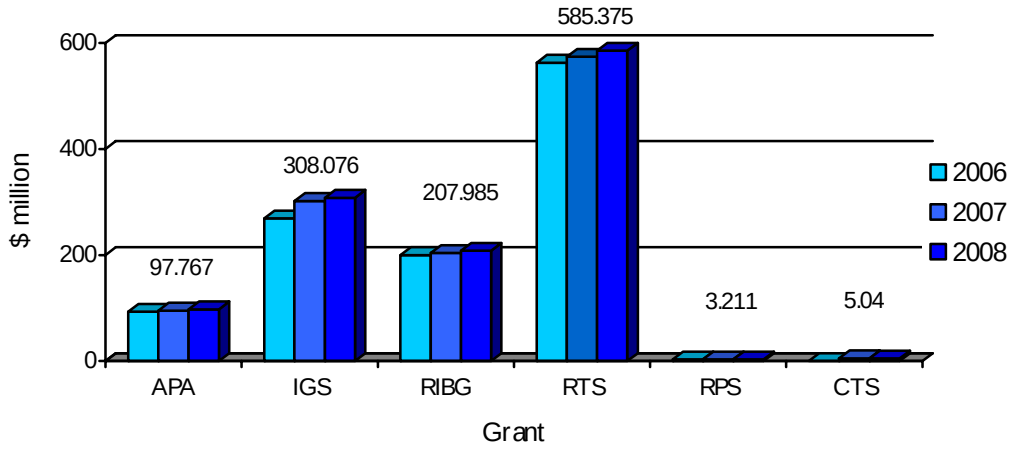
Research and research training are supported by a mixture of block grants and competitive grants programs, with the competitive grants coming primarily through the Australian Research Council (ARC) and the National Health and Medical Research Council (NHMRC). Funding for infrastructure and block grant support for research is an important input into Australia's research training performance and is critical to making Australia rise above the international pack.

Research block funding provides three important functions, as it:

- provides for core research capacity, for universities to meet the research needs of industry, government, and the community; and
- provides for flexibility, so that universities can adapt as these needs change; and
- enables anticipation, so that universities can meet the needs of the future.

There are three main research block grants available to universities. These are the Research Infrastructure Block Grant (RIBG), the Institutional Grant Scheme (IGS) and the Research Training Scheme (RTS). These are supplemented with the Regional Protection Scheme (RPS) for designated regional higher education institutions. In the 2007-08 Federal Budget these grant schemes were allocated approximately $1.1 billion in total. This represented a marginal increase from the previous year. There are also two smaller research training block grants available: the Australian Postgraduate Awards (APA) and the Commercialisation Training Scheme (CTS). Figure 2 demonstrates the minimal increase in research and research training block grants from 2006 to 2008, even in current dollars.

Figure 2: Research and Research Training Block Grant Amounts 2006 to 2008 (2008 values shown)[13]



Under *Backing Australia's Ability*,[14] there was a very welcome increase in funding for national competitive grants, principally through the ARC and the NHMRC. This has not, however, been matched by an increase in core research funding for universities, which provides the fundamental capacity on which competitive grants projects and many partnership research programs are based.

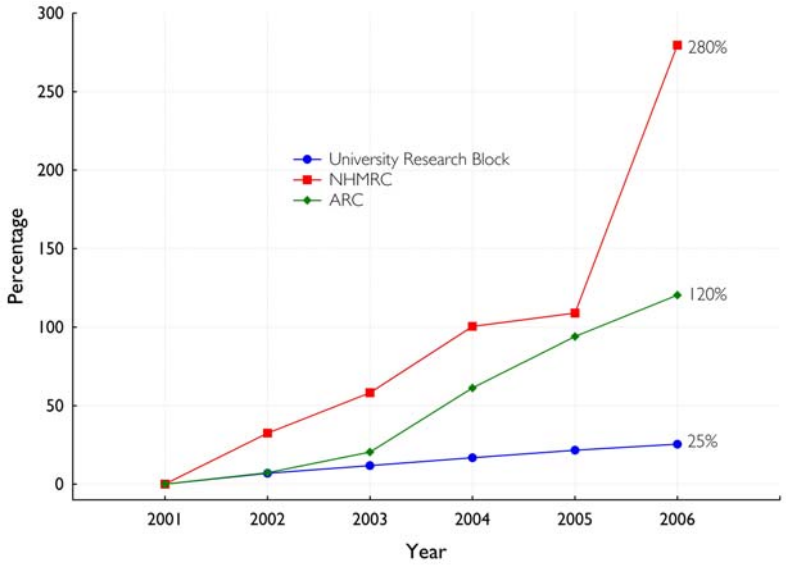
Figure 3 illustrates how research infrastructure support is not keeping pace with project funding provided through the ARC and the NHMRC. Infrastructure funding to universities has grown by only 25 per cent over the 2001-2006 period, whereas project grants have grown by 200 per cent in the same period.

13 DEST/DEEWR 2007/2008 Research Block Grant Amounts, http://www.dest.gov.au/NR/rdonlyres/39CE845D-89EB-46E9-924C-C3C61A0FECC4/19766/2008ResearchBlockGrantAmounts.xls

14 *Backing Australia's Ability*, 2001 and *Backing Australia's Ability - Building Our Future Through Science and Innovation*, 2004, http://backingaus.innovation.gov.au/

The increase in competitive research funding is disproportionate to the overall modest growth in the public funding of university infrastructure that underpins research performance. This has occurred despite the high administration costs associated with project grants, and the fact that the projects funded are often cross-subsidised by other university funds. This leads to the view within universities that 'winners are losers'. Reputational imperatives lead to economically sub-optimal outcomes obliging internal university cross-subsidies at the expense of other activities. It also leads to excessive and growing shares of administration costs in university cost structures because of the high application, administration and reporting costs of the competitive grants regime.

Figure 3: Relative increase in research funding by entity, 2001 to 2006 (2001 base = 0)



Sources: DEST Triennium Reports and Higher Education Reports 2001 to 2005; DEST Science and Innovation Budget 2006-07, Table 1.

5.3 Funding the full cost of research

As well as a significant increase in research block grant funding, Universities Australia strongly recommends supporting the introduction of funding mechanisms that provide support for the full cost of research. This could be achieved through the development of a transparent institutional-level process that takes into account specific costing for project grants. This is necessary for institutions to avoid having to cross-subsidise projects from other revenue sources. Universities Australia has been advised of many cases where an institution has been unable to accept a project grant because of insufficient funds to support the project.

It is envisaged that funding the full cost of competitive research projects will complement the proposed compact funding arrangements. Such an environment could adequately address the problems associated with cross-subsidisation and high transaction costs, reward excellence where it is found, and also encourage full cost funding from industry partners. However, Universities Australia reiterates that this system can only be successful once block grant funding is significantly increased.

Given that a significant amount of block funding is allocated to health and medical research projects, in order to better support research in general, one further suggestion is that responsibility for the block funding component of health and medical research be given to the more appropriate health portfolio, leaving the current amount of block funding to support non-health and medical research.

5.4 Other infrastructure support

There are other forms of infrastructure support for research, namely through the National Collaborative Research Infrastructure Support Strategy (NCRIS) and the Education Investment Fund (EIF).

The major 2008-09 Budget initiative was the creation of an $11 billion Education Investment Fund (EIF), which will absorb the $6 billion allocated to the Higher Education Endowment Fund (HEEF) and receive an additional $5 billion from the 2007-08 and 2008-09 budget surpluses. The EIF will be focused on capital expenditure on teaching and research facilities.

While the EIF may go some way towards addressing the maintenance backlog in universities, and to meeting new capital needs, there is a danger that, as the EIF will be open to applications for teaching facilities and also to applications from the Vocational Education and Training (VET) sector and other research facilities and institutions, the actual funds available to research infrastructure will be minimal.

It is also important that the funding from the EIF is not used to replace other sources of infrastructure support, for instance NCRIS, when there is a clear need for the Government to ensure additional funding. The NCRIS program was developed to provide collaborative research infrastructure support on a large scale and at a national level and is a vital element of Australia's research capacity.

The NCRIS program is still in its infancy and the process for fund allocation is still evolving, however, it is imperative that this program be continued alongside the EIF as a primary source of research infrastructure support.

As well as the NCRIS and EIF funding, there would be great benefit in establishing a program to support landmark research facilities (above $100m) in Australia. In addition to their other benefits for Australia's research profile, such facilities could be a magnet for top research students and early career researchers from around the world. One example of such a facility is the proposed Square Kilometer Array (SKA) telescope. Australia is currently one of two nations in the running to win the bid to host the $2 billion international project to build the next generation SKA telescope. Not only should Australia and the Australian Government be actively seeking to host the project but there should also be a commitment to supporting future large scale projects of this kind to boost international collaboration and our innovative capacity.

A further dimension of infrastructure support is the need for explicit guarantees to prevent cost shifting or 'crowding out' of existing Commonwealth block grant and State Government funding for infrastructure (including State funding for VET infrastructure) as new funding sources such as the EIF come on line. Only through receiving the full additional value of the new funding sources can universities deliver state-of-the-art internationally competitive infrastructure that will drive Australia's future research training performance.

6. Systemic Constraints on Research Training

Australia's high performance in research and research training has continued even though it is the only country in the OECD where public funding of universities has fallen as a share of GDP over the last decade. General taxpayer funding has fallen to the lowest of all OECD countries as a share of public university revenue (to an estimated 40 per cent in 2008).[15]

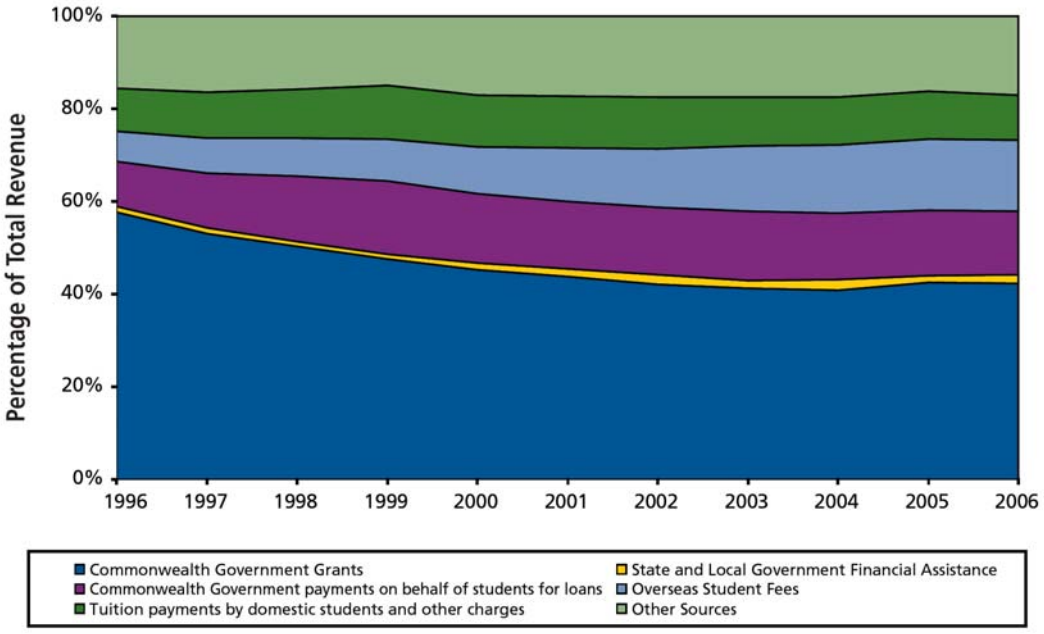
15 Based on DEEWR, *Portfolio Budget Statement 2008-09*, 2008., http://www.deewr.gov.au/deewr/Publications/Budget/

Universities Australia's submission to the current Review of the National Innovation System identifies a number of issues that have emerged as a result of under-funding of the national university system, including:[16]

- since 1989 the gap between actual and CPI-adjusted base funding has grown to around $1.6 billion and for wage-cost adjusted funding around $3.1 billion;
- Commonwealth recurrent funding of schools has been indexed on average at twice the rate as for universities;
- student to teacher ratios have risen from 12:1 in 1990 to 20:1 in 2006 with a consequential impact upon research supervision;
- between 2001 and 2006 university research block funding has fallen by 20% as a share of core research investment (universities, ARC, NHMRC).

The total percentage of university revenue by source from 1996 to 2006 is illustrated in Figure 4 below and shows a fall in government support for public universities relative to other sources of funding. In large part, increasing international student fees have substituted for core Commonwealth funding, with these fees now effecting a cross-subsidy to other university activities in a manner that is unlikely to be sustainable in the long term. This is particularly the case as a strengthening Australian dollar weakens our competitiveness in the international student market. Even within Australia, the capacity to raise full-fee domestic revenue has been circumscribed by Government phasing out domestic full-fee paying undergraduate places for public universities. Additionally, global financial instability following the sub-prime mortgage crisis in the USA has dramatically reduced investment earnings opportunities for universities.

Figure 4: Higher Education revenue sources as a percentage of total revenue, 1996 to 2006[17]

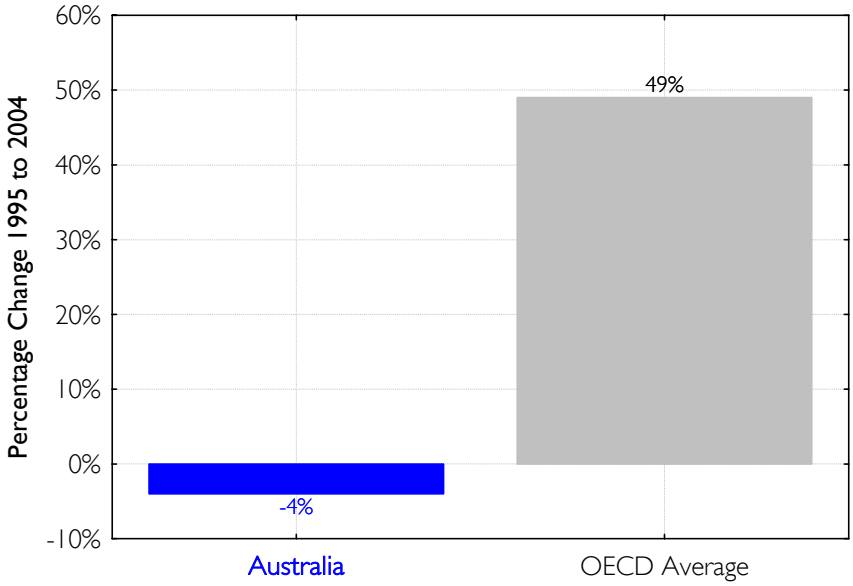


16 Sources include DEST, Triennium Funding Report, Higher Education Report, various years; ABS (6302.0) Average Weekly Earnings Australia, August 2007; ABS (6401.0) Consumer Price Index Australia, December 2007; AVCC, Student Finances Survey 2006; Australian Research Council, Annual Report, 2005-06.

17 DEST, *Finance: Selected Higher Education Statistics*, various years. Graph taken from Bradley *et al.*, *Review of Australian Higher Education: Discussion Paper*, Commonwealth of Australia 2008, p. 11.

These concerns relate directly to the issue of research training, because chronic under-investment in infrastructure, and increasing pressure on teaching staff and university administrations, are major threats to Australia's capacity to be a destination of choice for quality research degree students, whether domestic or international. In a competitive international market, Australia's own best and brightest may increasingly choose to pursue research training and research careers overseas, while the best international students will have a wide range of choices in study destinations, many of which are rapidly increasing investment in higher education at a time when funding in Australia has fallen and remains in negative territory (see Figure 5 below).

Figure 5: Australia versus OECD, average change in public investment in tertiary education



Source: *Education at a Glance* 2007: OECD Indicators, table B3.3 p. 222.

7. Supporting Research Students to Become Great Researchers

There has been much discussion of the general issue of skill shortages in the Australian economy; however the growing deficiencies of the high-end skill spectrum are often overlooked. For Australia to be competitive in a knowledge-intensive economy we are highly dependent upon the ability to attract and train human capital at the highest levels of knowledge creation.

The development of an interest in a research career is a process that starts in childhood. By the time students reach the age to enter university their interest in further education, and particular in science and technology subjects, has already been shaped by their school education. For this reason, it is critically important that Australia provides high quality school education that encourages inquisitive minds and an interest in science. Universities can also do more to provide opportunities for school students to experience the possibilities that a career in research could provide. This is something that could be facilitated through additional special purpose funding for educational outreach activities.

Britain's recent Sainsbury review of science and innovation policies[18] recommended that the British Government undertake a national promotional campaign for research and science careers. An

18 Lord Sainsbury of Turville, *The Race to the Top*: A Review of Government's Science and Innovation Policies, October 2007, http://www.hm-treasury.gov.uk/media/5/E/sainsbury_review051007.pdf.

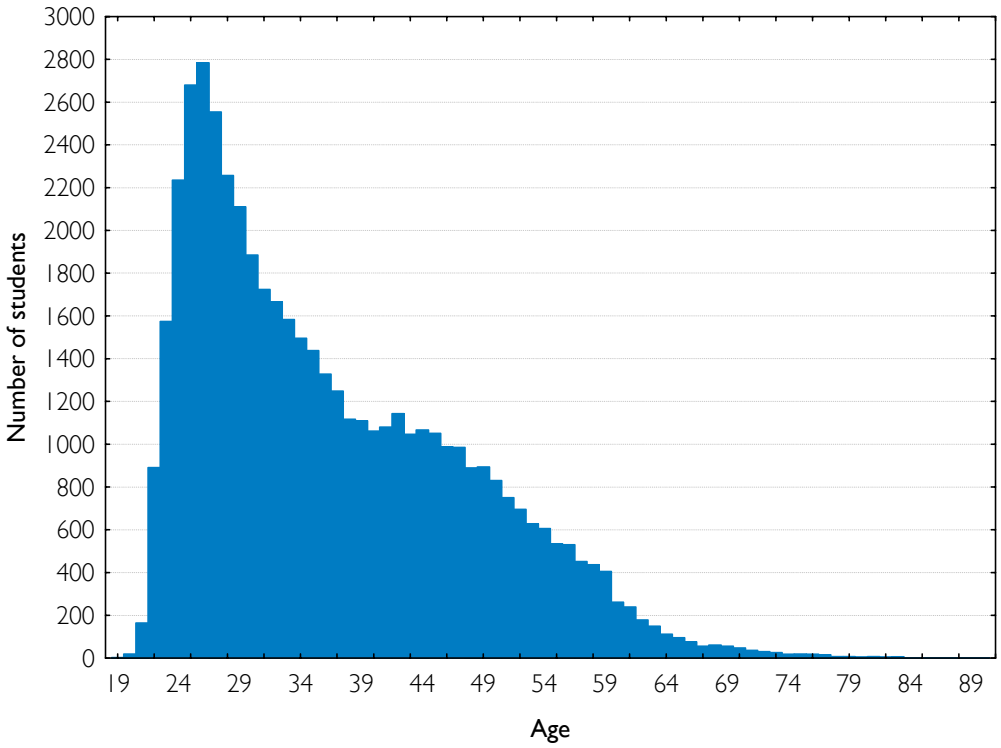
additional initiative considered in the report is a 'Science and Engineering Ambassadors Program' through which volunteers from the science and engineering sectors visit schools to inform students about the role of science in everyday life and excite them about career opportunities.

Even with an interest in a research career, the current reality is that bright undergraduate students will have a wide range of career options open to them, many of which will offer pay and other benefits not immediately available through research training. Consequently, it is important to have policy settings that make research training as attractive as possible to the best candidates. Universities Australia welcomes the Government's commitment to double the number of Australian Postgraduate Awards (APAs) and relax the requirements of the APA (Industry) linkages. These decisions reverse a long standing neglect of PhD scholarships, which has seen the percentage of students receiving an APA scholarship fall from 7.16 per cent in 1996 to 6.02 per cent in 2006.[19]

While the doubling of APAs is a welcome step, Universities Australia notes with concern that this year the level of the APA stipend will fall below the Henderson Poverty Line for the first time. Given the increasing accommodation, transport and other cost pressures faced by research students, Universities Australia supports calls from the Council of Australian Postgraduate Associations for an increase in the APA stipend to $26,000 per annum.

Figure 6 illustrates that many research students are over 30 years of age, and so are likely to be combining study with family, work and other commitments. The current APA stipend, which generally targets full-time students, does not meet all the life and study needs of this group.

Figure 6: Participation age of higher degree by research students



Source: DEST Selected Higher Education Student Statistics, various years

19 Universities Australia analysis, based on DEST *Students Selected Higher Education Student Statistics*, various years.

While Universities Australia supports the Government's commitment to increase the number of APAs, Research Training Scheme (RTS) funding has not increased, which effectively means that any increased demand for PhD places will not be matched by an increased ability for universities to offer quality supervision. With the increase of the student to staff ratio to 20:1, amongst the highest in the OECD, the ability to offer quality postgraduate supervision is in fact steadily eroding over time.

Without an increase in RTS funds, many institutions will not be able to increase the number of PhD students studying at their institution due to lack of research facilities or student space and lack of supervising staff members.

Australia now leads the world in the proportion of undergraduate international students studying at Australian universities (17.3 per cent, compared with an OECD average of 6.7 per cent),[20] however, the number of international students undertaking advanced research programs lags behind other countries. In Australia, 21.6 per cent of PhD students are international students, while in the UK the comparable figure is 45.0 per cent.[21] While the reasons for this disparity are complex, one initial step that could promote Australia as an international research degree destination would be to increase the number of International Postgraduate Research Scholarships and to include an APA-equivalent stipend (the scholarships currently only cover tuition fees). Another immediate measure would be to loosen the restrictions on AusAID-funded Masters students proceeding to higher degree studies, in cases where their sending country is supportive of their remaining in Australia for further study.

International enrolments in PhD programs represent the elite end of student recruitment. These students make their choice of university based on the quality of the program and the facilities and expertise that will be available to them during their studies. Australian universities are actively pursuing these top quality students for the overall benefit of their research programs, but also for the long term benefit of Australia should these highly skilled people choose to seek permanent residence. However a number of important deterrents exist to such students coming to Australia, mainly relating to the high cost of school education for those international students with children, which if addressed could be a material advantage to Australian universities in attracting quality research degree candidates.

8. Collaborative Approaches to Research Training

There are already numerous instances of universities offering research training in conjunction with research institutes and corporations. There are also a growing number of offerings of professional doctorates in fields such as law and psychology. In future, there are likely to be more opportunities as universities seek to differentiate their higher degree offerings and attract the best candidates. This could include, for example, offering structured internships to research students to allow them to experience work in a non-university environment. Universities Australia has developed a framework proposing a national internship scheme for Australia, in collaboration with industry and other stakeholders.[22]

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20 OECD, *Education at a Glance*, 2007.

21 DEST, *Students: Selected Higher Education Student Statistics*, 2006; Higher Education Statistics Agency (UK), *Students in Higher Education Institutions 2006-07*, 2008.

22 Universities Australia, "A National Internship Scheme: Enhancing the skills and work-readiness of Australian university graduates", *Position Paper No. 3/08*, May 2008, http://www.universitiesaustralia.edu.au/documents/publications/discussion/National-Internship-scheme-May08.pdf.

Australia could learn from the extensive consideration given to innovation in research training in the United Kingdom. The Sainsbury review report mentioned above, presented many options for increasing the UK's competitiveness internationally particularly in light of the competition from emerging economies such as China and India.[23]

The Sainsbury report canvassed many issues that are common to Australia, for instance linkages between universities and industry, and career pathways to research. Among other things, the report examined the success of the Knowledge Transfer Partnership (KTP) scheme, and recommended doubling the number of KTPs in operation.

The idea behind the KTP scheme is to place recently qualified people in firms for one to three years to introduce a new product, service or process in partnership with a suitable university or research institution. The aim is to provide practical training and career development to the graduate and introduce fresh ideas into business. It is reported that on average each KTP project to date has resulted in four new research projects being initiated and two research papers being published. Moreover, in excess of 80 per cent of KTPs plan for future collaboration, and there are about 300-350 funded each year with a known demand of about 900.

The Sainsbury report noted that for every £1million of Government spending the resultant average benefits to participating businesses were:

- £4.25 million annual increase in profit before tax;
- £3.25 million investment in plant and machinery;
- 112 new jobs created; and
- 214 company staff trained.[24]

The current KTP system is not suitable for all universities and businesses. Therefore, as well as doubling the number of KTPs, the report recommended the development of a smaller, more flexible and less expensive scheme to target a wider range universities as well as engaging more small and medium size enterprises (SMEs).

The KTP concept has some similarities with the Australian Government's Enterprise Connect program which promises to bridge the cultural gap between the business and research sectors. While a KTP program could be aimed specifically at recent graduates to encourager further involvement in research, the Enterprise Connect program is aimed at building better links between industry and research institutions. Under the latter initiative the Government will fund up to 50 per cent of salary costs to place a researcher into a business for 12 months. Given the concentration of SMEs in Australia, the Government may want to consider opening this program up to international businesses to provide a wider variety of opportunities and also improve international research links.

The KTP concept also has overlaps with Universities Australia's proposal for a National Internship Scheme. While the internships scheme is directed initially at coursework partnerships, many doctorates increasingly include coursework elements. In addition, the scheme has the capacity to

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23 Lord Sainsbury of Turville, *The Race to the Top: A Review of Government's Science and Innovation Policies*, October 2007: http://www.hm-treasury.gov.uk/media/5/E/sainsbury_review051007.pdf

24 Ibid., p. 62.

provide for direct research internships. An initial pilot of the scheme is being developed through collaboration between the three South Australian universities (Flinders University, The University of Adelaide and the University of South Australia), businesses and government departments, facilitated by Universities Australia, Australia 21 and Business-SA.

Consistent with innovation in research training through work-based elements is the opportunity for individual universities to pursue other elements of innovation in research training should they so choose. For example, a recent workshop run by the Council for Humanities, the Arts and Social Sciences highlighted growing demand for PhD graduates in professional and managerial roles, and for PhD graduates with international experience.[25]

Consequently, universities may increasingly consider offering a range of elements within a PhD program, beyond the conventional research project, in order to prepare PhD graduates for the wider variety of roles they may be expected to fulfil. Innovation in the manner of PhD delivery by universities – in articulations, supervisory panels, multi-disciplinary opportunities, cross-institutional exchanges and other modes of delivery – are consistent with this approach, and represent a commitment from universities themselves to advance the delivery of research training in Australia.

9. Conclusion

Universities Australia is pleased that this inquiry is reviewing the central role of research training and the research workforce to Australia's innovation system. Australia should aim to be the destination of choice for our own research students and early career researchers and for top researchers from around the world. The work of these exciting young scholars is a fundamental driver of research excellence and economic innovation and must be fostered by supportive government policies.

Contact Details

Universities Australia would be please to provide more information to the Inquiry on any of the matters raised in this submission. For further comment, please contact Dr Glenn Withers AO, Chief Executive Officer, P: 02 6285 2104, E: glenn.withers@universitiesaustralia.edu.au.

25 Council for Humanities, the Arts and Social Sciences, 2008 The PhD in the Humanities, Arts and Social Sciences, 7 March 2008, University of NSW, http://www.chass.org.au/events/2008/phd/