GROUP OF EIGHT

Group of Eight response to DIISR consultation paper: *Meeting Australia's research workforce needs*

Executive summary

The Group of Eight (Go8) welcomes the Government's commitment to developing a comprehensive research workforce strategy. Australia's research capacity and the continuing translation of research into policy, products and services is directly linked to the future productivity of the economy, social wellbeing, environmental outcomes and the nation's long-term prosperity.

The *Meeting Australia's research workforce needs* consultation paper provides a useful starting point for discussions on Australia's research workforce needs but the Go8 believes that some issues will need to receive more attention in the final strategy to ensure it is comprehensive and well targeted. In particular, the paper gives insufficient attention to:

- the quality of both the research workforce and of the research training experience - increasing the size of the research work force will not be sufficient in itself to keep Australia competitive;
- interdependencies between the research workforce and other parts of the innovation system, including schools and research users;
- the roles and importance of research-trained people in the broader workforce including in industry and government;
- the need for a whole of government approach and the removal of inconsistencies between the proposed strategy and other policies and programs (for example in relation to visas) that could impede its implementation; and
- the dependence of the strategy on increased and better targeted funding and a concentration of capability (talent and infrastructure).

The demand for workers (employers, self-employed people and employees) having research training extends beyond the researcher workforce itself and is increasing. The research workforce is not uniform but segmented according to disciplines and the economic and sectoral contexts in which researchers work. This creates complex and dynamic patterns of supply and demand which have implications for the nature and quality of research training, requiring new approaches, higher levels of support and flexibility. The growth of cross-disciplinary and multi-disciplinary research places additional demands upon the size and skills of the research workforce.

To maintain the supply of students capable of and wishing to undertake research training, the strategy must improve the attractiveness of career options and pathways, especially at the early and mid-career stages. There are special needs with respect to the academic workforce given the demographics of university staff, increasing demands on universities and the critical role of universities in providing highly skilled professionals and support workforce to all other parts of the

innovation system. Issues include infrastructure quality, certainty of employment and remuneration. It is simplistic to equate moves from the narrowly defined research workforce with attrition but actions to facilitate movement back into the research workforce could have many benefits in both directions.

The importance of tapping into the potential supply of high quality international research students and academics cannot be underestimated. Australia must be seen as a welcoming and high performing research destination if we are to be able quickly and effectively to build research capacity in a highly competitive global environment. A coordinated approach by Government to innovation, research and migration policy setting is essential. Equally, high performing Australian researchers will be sought by and attracted to other countries. Governments need to support research networks so that Australia can continue to benefit from the international flow of research results.

A world class research training environment requires excellence, scale and diversity. Australia's incremental approach to policy development is no longer adequate to the task; a radical overhaul of the policy and financing framework for research and research training is essential. What is needed is a framework that provides for: full cost funding of research and research training; the allocation of research block grants based on Excellence in Research for Australia (ERA) and other research quality assessments; the funding of indirect costs using a unique rate for each university; incentives for 'hub and spoke' approaches to research collaboration; and the development of coherent international research collaboration strategies.

Supported actions

A number of important actions have been identified which if adopted would be positive steps in helping to build Australia's research capacity and would help Go8 universities in managing their research training programs.

In particular, the following key actions and proposed timeframes are supported by the Go8 as a matter of priority:

- Opening Australian Postgraduate Awards (APAs) to International Postgraduate Research Scholarships (IPRS) recipients. (Short term)
- Extension of APA scholarship to 4 years, from the current 3.5 years, in line with the Research Training Scheme (RTS) guidelines. (Short term)
- Alignment of visa conditions with scholarship conditions (Short term)
- Linking stipend levels to consumer price index (CPI) increases to ensure that they better meet the living costs of HDR candidates. (Short term)
- Recognition of cross-institutional enrolments, especially shared completions, under the RTS funding guidelines. (Short term)
- Revising and expanding both RTS and IPRS funding including a move to fully cover the costs of research training, at an appropriate cost per RTS place for the different disciplines, and flexibility in managing these grants. (Short term)

- Review and enhance the ARC and NHMRC Fellowships schemes to provide the opportunity for high-quality researchers to progress through the various fellowship levels based on their performance and to facilitate the transition of researchers from research student to early-career researcher. (Short term)
- An overall strategy that covers the full education life cycle and provides incentives and drivers to encourage increased numbers of high school students to study the enabling and core sciences at a level that opens up future research career options is critical to deliver the flow of enrolments to higher education, and then higher degrees by research. (Medium term)
- Improved resources to enable enhanced international collaboration including enhancing the attractiveness of Australia as a career destination and the inclusion of university academics on the Government's Skilled Occupations List for independent migration to facilitate suitably qualified individuals settling in Australia. (Short term)
- The Government should continue its move towards the full funding of the indirect costs of research funded by the research councils. In doing this it should use a unique indirect rate for each university. This will allow for greater differentiation of research missions within the sector and would be consistent with international approaches. (Medium term)
- Government should maintain a binary model of research funding and provide universities with research block grants awarded on the basis of a quality assessment while using research funding councils to award competitive research grants which should have associated block grants covering their indirect costs. (Medium term)
- It is inconceivable that quality research training can occur in an environment which cannot produce quality research, and Excellence in Research for Australia (ERA) ratings serve as one set of indicators of the quality of research output. However, ERA alone is not sufficient for recognising and funding research training quality; additional indicators must be used, such as those relating to the research culture, the quality of supervision, and the rigour of assessment. (Medium term)

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Introduction

The Group of Eight (Go8) believes that the Department of Innovation, Industry, Science and Research's (DIISR) *Meeting Australia's research workforce needs: a consultation paper to inform the development of the Australian Government's research workforce strategy* provides a useful starting point for a discussion of Australia's research workforce needs and agrees that a robust strategy requires actions by universities and the employers of researchers, as well as by government.

While we broadly support the paper we believe that in some respects it takes too narrow a focus, failing to recognise the diverse nature of the research workforce and the interdependencies that exist with respect to other parts of the innovation system. In particular, we believe that the paper underestimates the potential growth in demand for people having received research training; and that it pays too little attention to the need to maintain and improve the quality of both the research work force and research training. Seeking to increase the size of the research work force is not sufficient in itself to keep Australia competitive.

As a more general comment, the paper fails to address the funding implications of any strategy aiming to increase the size of the research workforce and improve its quality. Increased funding is essential as universities already receive insufficient base funding. They are no longer in a position to top up government support or otherwise meet government funding deficiencies, whether these relate to the maintenance of capital or the provision of postgraduate education. **The Go8 strongly believes that should funding constraints make it necessary to choose between increasing the number of students receiving research training and improving the quality of such training, national interest clearly requires that we work to improve quality.**

We would also emphasise that an effective long-term strategy which addresses the issues identified in the consultation paper will require a whole of government approach. For example, discrepancies between the requirements of visas and the characteristics of research support schemes can limit Australia's ability to tap international talent, as can issues relating to visitor access to the health and education systems.[1] **Especially at a time when the global financial crisis has led to a temporary peak in the number of high quality researchers actively seeking new positions, it is important the government act to remove any impediments to the free movement of outstanding researchers into Australia.**

More generally, research and the research workforce are relevant to the activities of most government departments and any government strategy should take into account the needs of all

[1] As an example, there is a new DIAC requirement that universities must guarantee OSHC cover for the duration of a student's visa rather than for the duration of their course. This presents problems because the IPRS scholarship funding is for a maximum of 4 years, i.e. 3 years plus up to two 6-month extensions. The Pre Visa Assessment (PVA) requires a commitment to cover OSHC for 4 years 4 months and 14 days. The policies of DEEWR and DIAC seem to be in conflict and as a result this is impeding Australia's ability to attract the high calibre international students that IPRS is meant to support.

departments, as well as being cognisant of how their policies and programs can have an impact in this area.

While the consultation paper recognises the need for an expanded research workforce to drive the development of Australia's innovation system, it does not sufficiently acknowledge the dependencies that exist between this broader system and research. It is not possible to optimise a system by concentrating on just one of its components, as all need to be equally effective. The biggest returns come from improving the performance of that component that is at any time limiting the operation of the others. For example, the ability to attract domestic students to PhD training will depend on the number of students attracted to undergraduate courses and the proportion of these that develop an interest in research. In turn this will reflect the effectiveness of the school system, not just in passing on the necessary skills and knowledge but also in generating an interest in areas of potential demand, a sense of their importance and an awareness of the career and other opportunities they present.

In some areas, such as mathematics, there are already problems which require universities to provide remedial courses. If as a nation we are unable to attract a sufficient number of students wanting to take up research training in mathematics, universities will find it ever harder to employ the mathematicians necessary to generate a future pool of school teachers with the required levels of knowledge, let alone have the capacity to provide teaching to remedy the shortfalls in school teaching or meet the demand from business for mathematicians. The implications of this would be far-reaching given the underlying importance of mathematics, quantitative analysis and modelling to most areas of science, social science and engineering as well as to many areas of business, including financial services. **An effective school system and high quality undergraduate education are essential if Australia is to attract high quality postgraduate students.**

A research workforce strategy has to acknowledge that its success will require that those parts of the innovation system that use research also increase their capacity as the research workforce grows. The absorptive capacity of the system has to increase in balance with the research output and this has to recognise that effective technological innovation has normally to work hand-in-hand with non-technological innovation, emphasising the need for research to develop understanding beyond the areas of natural science and engineering. Similarly, the demand for researchers and research-trained employees in business and government depends in part on the understanding that employers have of the relevance of research or the benefits of research training. In part this reflects the education and training that these employers themselves received and the extent to which it identified the need for continuous innovation and the role that research can play.

An effective innovation system requires excellence across all its components, whether in business management, the financial and legal systems, government, research, policy, and so on. What all these areas have in common is that their excellence and level of performance reflects the excellence of the people working within them. In turn this reflects the quality of the education and training they have received. **In a very real sense this places universities at the centre of the innovation system.**

As the source of supply for other parts of the system, it is essential that universities maintain and further develop their competitiveness as employers, given that any decrease in the quality of university staff would have flow through effects to all other parts of the innovation system. The Go8 universities play a particularly important role in this context, not only because of the scale of

their research and research training activities (accounting for 70 per cent of all university research income and over 55 per cent of all higher degree by research students who graduate from Australian universities), but also because around 50 per cent of Go8 PhD graduates subsequently work in a university, contributing to the overall health and vitality of the system.[2] At some stage of their career, many Australian academics will have spent time studying or working at a Go8 university and the universities within the Group recognise that this imposes on them particular responsibilities for the health of Australia's tertiary education system.

Demand is increasing

While the consultation paper focuses on the need to maintain and increase the number of researchers in the workforce, it does not pay sufficient attention to the need for research-trained people working outside the research system. A vital and vibrant innovation system requires creative but disciplined people in all its elements. The critical thinking, problem solving and innovative thinking that high-quality research training produces is necessary across the innovation system. **Good research training produces more than a narrow set of technical skills. People with such training have the capacity to contribute as senior managers in business or the public service, as well as within academia and research laboratories, whether public or private sector.** They help create an environment conducive to innovation, are open to change and able to use ideas and research from other sources.

In some areas, such as venture capital or technical regulation, possessing a higher degree by research may be essential but in many others it is seen as offering a competitive advantage. Overall, only around one quarter of higher education by research degree graduates start working for universities and in some disciplines the proportion is much less (although, as mentioned earlier, the proportion of Go8 PhD graduates working for universities is 50 per cent, 5 to 7 years after they complete their qualification). Nevertheless, universities are responsible for producing all these graduates. This has always been the case but as employers recognise the broader benefits of research training, they become more likely to seek out employees having such training. Indeed, a recent paper on the future of graduate education in the USA noted that:

> *...in the knowledge economy, a graduate degree will become the new bachelor's degree, the minimum education credential that high-skills employers require.*[3]

As shown by this quotation, the increasing demand is not just something that is happening within Australia but reflects a worldwide trend. Given the mobility of highly-skilled people, this means that Australia is part of a world-wide fight for talent, one that is having consequences for recruitment and retention across the innovation system.[4]

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[2] *PhD Graduates 5 to 7 Years Out: Employment Outcomes, Job Attributes and the Quality of Research Training*. Paper prepared for the Joint Meeting of the Go8 Deputy Vice Chancellors, Research and Deans and Directors of Graduate Studies. Canberra. 27 February 2007. The University of Queensland Social Research Centre (UQSRC)

[3] *The Path Forward*. Commission on the Future of Graduate Education in the United States. April 2010.

[4] The fact that employers are seeking out the most highly qualified employees may be one reason that Australian data show a significantly decreased demand among domestic students for masters by research courses while demand for doctoral positions is increasing. (See Attachment 1.)

As the consultation paper notes, there are many factors serving to strengthen demand for researchers within Australia. These include government policies to increase investment in research and to grow the proportion of the population receiving a university education, as well as escalating worldwide demand generated by government policies to promote innovation as a means of driving economic development and international competitiveness. A further factor in Australia is the demographics profile. Within five years the school leaver demand for university places will accelerate, quite apart from any policy to increase the proportion of the population receiving a university education. All of these factors place pressure on universities to grow, to increase their student populations and to increase the number of postgraduate students. However, the demographics of university staff profiles (in particular their ageing workforce) mean that universities are going to experience pressure in replacing staff who retire, quite apart from the need to increase staff numbers.

One concern the Go8 has with the consultation paper is that it seems to take the increase in demand as a given, so that the strategy is reacting to this. While we agree that demand is increasing, the strategy should explicitly address factors that will maintain this demand to ensure that the quality of our research and broader workforce does not fall behind that of our competitors. In particular, the strategy should address ways of promoting the use of research by business and government as ways of promoting innovation and improving performance.

Segmentation of demand

A limitation of the consultation paper is that it tends to treat the research workforce as a single entity. This is to simplify the problems facing Australia. Especially in the science, technology, engineering and mathematics areas, research training builds and develops a specialised set of skills, knowledge and expertise, as well as the more generic competencies mentioned earlier. This specialisation is usually specific to particular fields of research and not readily transferable to other fields or disciplines because of the depth of education, training and experience necessary to acquire the technical and other proficiencies necessary to achieve research excellence. [5] In effect, the research workforce consists of many separate workforces, each having different demand and supply characteristics.

A molecular biologist cannot perform research in nanotechnology or electronics engineering, or start research on insect taxonomy, much less become a leader in the field, without undergoing years of additional training. As a result, it takes time to develop people with the skills necessary for specific areas of research if such people are not already available. **In addressing the need for a quantitative increase in the research workforce, it is also necessary to consider the fields in which such an increase might be necessary.** The consultation paper notes the need to align research training with areas of institutional and national strength and priority but it is important to do this in a way that reflects the dynamism of the innovation system.

The need for particular research skills can change rapidly, depending on a whole range of factors and can extend beyond our present understanding of need, national priority or opportunity. There was no long-term forecast predicting the current demand for geoscientists before it developed and

[5] This also raises concerns about the consultation paper's identification of HDR qualified people working in non-research positions as potential members of the research workforce. Moreover, quite apart from issues relating to specialisation, the speed at which research advances can in some areas make it very difficult for someone leaving the research sector to return after extended leave.

advances in research can themselves create opportunities that do not currently exist. The problem is that to develop specialised skills takes time. While it is possible to recruit internationally, this is not easy, especially as other countries may be responding to the same drivers and seeking to attract Australian researchers. Moreover, without an already existing domestic capability of sufficient quality, it can be difficult to attract researchers from overseas and impossible to provide the necessary training domestically.

The need to respond quickly to opportunities or challenges that emerge is one reason why universities need to maintain a broader research capability than that necessary to respond to existing needs and priorities. Maintaining a broadly based capability enables universities to recognise emerging threats or opportunities and to provide the educational (and other more immediate) services necessary to develop people with particular skill sets needed to respond to them. The research base in universities needs to be broader and more diverse than that necessary to serve the immediate needs of teaching, government and industry. This broader base provides the longer-term opportunities that arise from the advancement of knowledge, as well as a national capacity to respond to the unexpected.

Segmentation of the research workforce also involves factors that go beyond disciplinary divisions. The experimental development taking place in a large manufacturing firm can be very different in terms of the demands that it makes on the research workforce from the demands acting on university researchers performing the basic research that is creating new opportunities rather than responding to opportunities already identified. Performance measures, research management processes and even researcher values may be different in each case, even though the two activities are complementary and in the longer term interdependent.

Go8 universities are exploring the implications for research training of these different research cultures. For example, member universities are considering the advantages of establishing integrated Academic Health Centres similar to the leading medical/health centres overseas which provide a clinical interface for research, teaching and clinical practice. As part of the implementation of health reform initiatives, the Australian Government has the opportunity to establish such centres in metropolitan and regional Australia to bring together hospital and community services sectors with research, academic, clinician, and other health professional personnel. These centres would drive efficiency, encourage primary prevention, and support a research-led, evidence based approach to health. From a research training perspective they would consolidate a medical research environment which fosters the rapid translation of research findings to better health and patient outcomes by feeding research outcomes directly into undergraduate, postgraduate and continuing professional education.

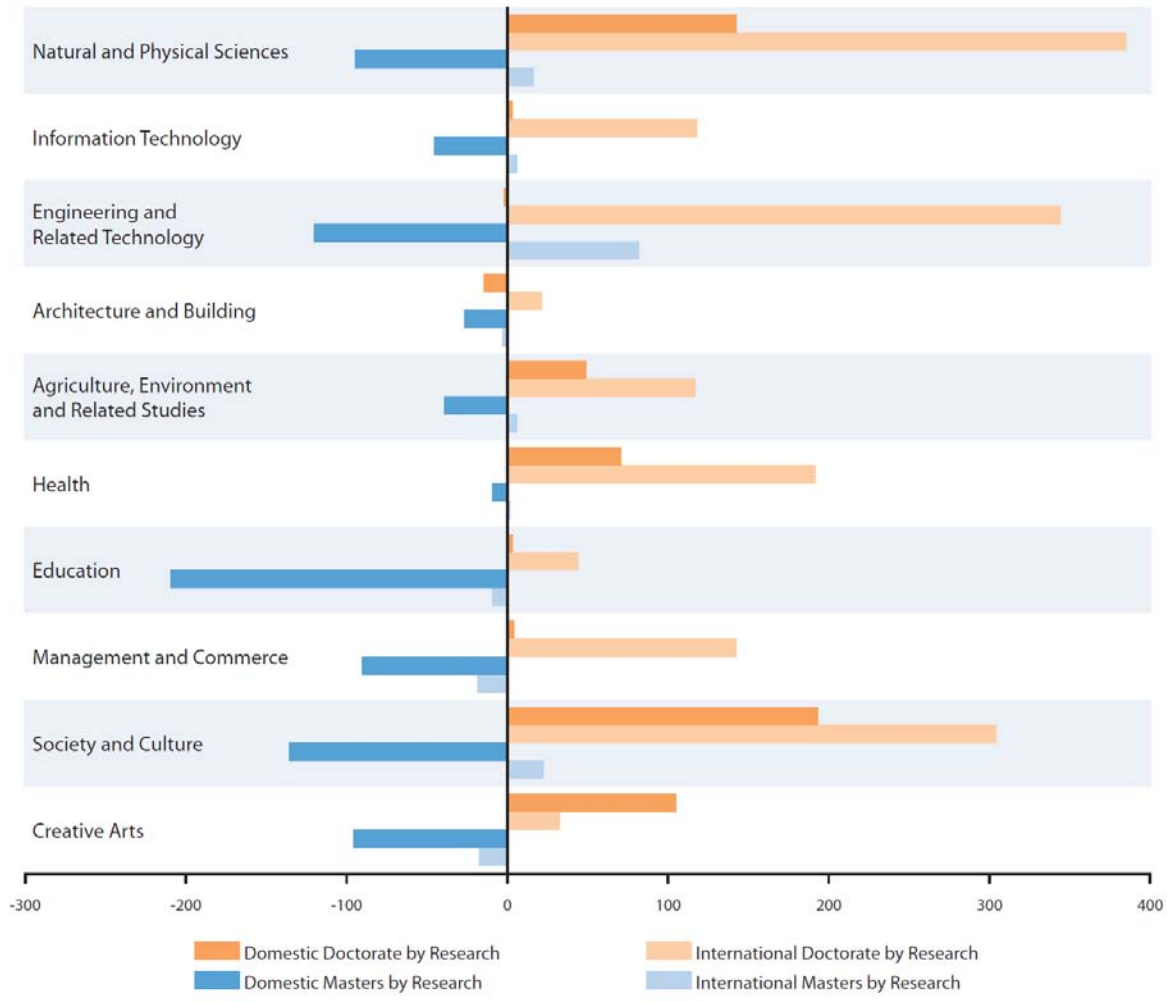
Many students already enrolled in Go8 member PhD programs work in non-university research organisations such as CRCs, CSIRO, medical research organisations and others able to offer a different but high quality research experience. In many cases the universities negotiate funding arrangements with the host research organisations. However, such negotiations are difficult because the universities themselves receive significantly less than the actual costs of the training and services they provide to the students. **Full cost funding of research training would make it easier for universities to broaden the research training they provide by working with non-university research providers.** Such funding would need to cover all the costs of training, supervision, infrastructure, consumables and student support services, noting that these can vary significantly between disciplines and areas of research.

Need for more attractive academic careers

The Go8 believes that an effective response to the issues raised in the consultation paper requires a strategy that includes actions to make research careers in Australia more attractive. In particular, it will be important to improve the appeal of academic careers within Australia in order to maintain a diverse research base able to respond to new and emerging national needs for research capabilities. As mentioned already, Australian universities are operating in a highly competitive, global labour market. **If Australia is to attract and retain the research workforce it is going to need, it has to draw in qualified and quality researchers from abroad, as well as those trained here.** If it is not able to offer a working environment sufficient to do this, Australian researchers may choose to take advantage of the better opportunities open to them overseas.

A research workforce strategy cannot ignore the critical importance of international students in building our national research capability. As shown by the data provided in **Figure 1**, international students account for a major proportion of commencing PhD students across all fields, and especially so in critical areas such as engineering. There has been little growth since 2001 in domestic HDR students, except for PhD commencements in natural and physical sciences, environmental studies, health, society and culture and creative arts.

Figure 1: Change in commencing students Higher Degree by Research by broad field, domestic and international, Australia, 2001 to 2008



An over-reliance on international HDR students will leave Australia vulnerable to the global competition for talent, especially if there are restrictions on the ability of such students to take up positions in Australia. This is one reason why the Government should remove any unnecessary impediments to the movement of these students into Australia or to their continued work here after they have completed their training. The development of attractive career pathways should take into account not only the needs of these students but also recognise the implications of their experience of conditions and opportunities in other countries for both their own career decisions and those of their peers.

The attractiveness of a research career depends on a number of factors that include but go beyond remuneration. A researcher wants to work with other researchers recognised as world leaders in their field. Excellence attracts excellence. Having access to high quality infrastructure is important. Having to use equipment that is not leading edge can make research more difficult, significantly reduce productivity, make it hard to attract collaborators and decrease the likelihood of making significant breakthroughs. General conditions and the working environment are also important but so are more intangible factors. The perceived status of the researchers within the community can be a major factor for students making decisions about career paths.

One of the major determinants behind the decision of students to enrol in a PhD and consider an academic pathway, is their immediate environment including feedback from current academic staff regarding their career pathways and job satisfaction. A major challenge is how to deliver significantly increased research funding levels (especially through ARC & NHMRC) as recommended in Building Australia's Capacity (the report of the *House of Representatives Inquiry into Research Training and Research Workforce Issues in Australian Universities*) which recommended that the Australian Government increase the funding pool for Australian Research Council and National Health and Medical Research Council grants to enable a minimum success rate for applicants of 40 per cent.

Other important issues include certainty of employment and the availability of positions that are longer-term and not grant dependent. This is true at all stages of a research career. Particular pressures arise from the later completion of first degrees as a result of part-time study and the need for paid work. This factor is becoming more important as students are starting PhD training at an older age. Together these factors raise an important issue that the consultation paper does not address – the difference between national interest and individual benefit.

It is clearly in the national interest that we have in Australia a large and diverse pool of researchers able to meet the emerging and changing workforce demands from the business, government and education sectors. **The more highly educated our population and the greater its propensity to create, recognise and grasp opportunities to do new things and to improve the way we operate, the more competitive we will be as a nation and the better the quality of life for us all.** However, while the national benefit is clear, the benefit to the individual undertaking the necessary training can be less distinct.

The later the age at which someone achieves their top qualifications and the longer it takes them to win a position that involves some degree of continuity, the more likely it becomes that they see the personal sacrifices necessary as being unlikely to produce a commensurate return. Research students and even researchers in post-doctoral positions may see themselves disadvantaged compared to their friends of the same age who may be earning more, have access to mortgages and

experience greater certainty of employment with less competition. Anecdotal evidence suggests that mining companies are offering highly paid positions to students yet to complete their bachelor degrees because they already have the skills that the companies need. Actions of this kind can have a significant impact on the quality, as well as the number, of the postgraduate intake.

Given the current realities of a career in research, there is no guarantee that the time and effort devoted to an extended education will produce increased earning potential over a researcher's lifetime.[6] In the past this may have been less relevant – in part because of the levels of government support available, in part because of an implicit social contract which balanced direct rewards against the ability of individual researchers to follow their own line of interest. The expansion of the research workforce and its diversification, combined with increased administrative, accountability and other workloads, has invalidated such a contact, if it ever existed.

Clearly, the factors affecting the attractiveness of a research career in general or a research career within a university depend in part on what alternative opportunities exist for people with a particular set of qualifications and expertise. This will vary from time to time and from place to place. Moreover, the factors that make research training attractive may be different from those that make a research career attractive.

The Go8 recognises that research training may become a more appealing option for students if it is set in a broader context and there is no suggestion that its purpose is only to provide a direct pipeline to a research career. **Students need to understand that research training provides an opportunity for personal development and intellectual exploration that offers an entry into a wide range of careers.** Rather than cutting off employment options, it provides a means of generating new ones which are additional to those available to someone without such training as well as richer, more diverse and different.

The Go8 universities are already examining ways in which to improve the research training that they offer, responding to the new and more diverse demands coming from employers. Changes to the form of the training we provide will reinforce our students' appreciation of the diverse career pathways that research training has the potential to expedite. However, broadening the training experience will inevitably mean students taking longer to complete their PhDs.[7] At the same time, the critical position that university staff play in creating the skilled and knowledgeable workforce on which Australia depends means that the research workforce strategy should specifically address ways of enhancing the attractiveness of university research as a career. Initiatives might include changing the balance between fixed term and contract positions, as well as increasing the term of research grants.

Starting salaries for graduating PhDs is an issue. In the latest Australian National University (ANU) enterprise agreement it was agreed to increase the commencing rate for a Level A academic from A6 to A8 and then B2 in the following year to reflect the need to attract PhDs . It is also necessary for

[6] A media release from Graduate Careers Australia on 4 September 2009 noted that the median salary for postgraduates with a coursework masters was $70 000; while for research masters and PhD graduates it was $65 000, despite the greater personal demands and investment of time needed to earn a PhD.

[7] This can present a dilemma. A Go8 commissioned study on *Perceptions of Australia as a postgraduate research destination* found that the shorter duration of an Australian PhD compared to opportunities in North America helped to attract international students. However, data from the United States show that in many fields it can take seven to more than ten years to complete a PhD.

the university to fill the gap in funding where they are employed on grants. ANU also introduced a new employment category of Contingent Funded Continuing positions to assist early career academics have a sense of job security, as an alternative to a fixed term appointment, which often gets extended.

From a government perspective it will be important to take a holistic approach to making research careers more attractive. This means looking at all the schemes that support researchers, recognising that they are drawing on a common pool of people and that together they should offer a coherent career pathway. A detailed review of all such mechanisms, from those aimed at research students to those supporting senior fellowships, could examine the potential for high quality researchers to progress sequentially though various fellowship levels based on their performance and the excellence of the research contributions they have made. The relative number of fellowships at different levels, together with the success rate at each level, can send strong signals to potential applicants about their likely career progression. **A system that facilitates career progression based on performance could help remove the perception of continued employment depending on a lottery system in which high level performance is not in itself going to ensure ongoing employment.**

For example, the current ARC fellowship schemes (and to a lesser extent the NHMRC fellowships schemes) do not provide a coherent 'career fellowship' program. This has come about because of a mismatch in the number of fellowships at different levels including an underfunding of fellowships at the Australian Research Fellowship (ARF) level and the adhoc- funding of fellowships schemes. What is required is a review and enhancement of the ARC Fellowships schemes to provide the opportunity for high-quality researchers to progress through the various fellowship levels based on their performance. A similar enhancement of the NHMRC schemes would also be required. Such a proposal should be incorporated into the priority areas for action. Enhancement of the ARC and NHMRC fellowships schemes would also need to look at the attractiveness of the fellowships including renumeration and the numbers of fellowships to ensure the transition between being a research student and being an early career researcher.

Consideration should be given to establishing a more systematic approach to promoting academia as a career option. A single career centre for the academic profession that could coordinate generic career material, undertake the research and provide advice. Such a centre could also provide career-planning advice for existing academics. The development of a planned and strategic approach for identifying talented students who could be targeted for development and nurturing would also assist. Such a framework could be in the form of a toolkit for academics so they can undertake a guided and evidence based approach to this important role they must play at an institutional level. It will be critical to be discussing an academic career and the benefits of such as early as possible, including in year 11 and 12.

In addition to reviewing its support for individual researchers, the Government should evaluate its block funding mechanisms. Significant benefits flow from concentrating such funding in centres of excellence, as discussed later. **Stable block funding can also help universities provide more stable career paths and to increase the quality of their research by facilitating strategic research management and the taking of greater risks.** We discuss this in more detail in the final section of this response.

Focus on quality

The consultation paper provides a detailed analysis of the need to increase the quantity of research training places but a research workforce strategy needs to provide more emphasis and guidance on the quality of research training.

Universities, like other employers, are competing for researchers in a global market, and we need to be aware of the expectations that exist in that market. Employers are continuing to place more emphasis on some of the more generic skills associated with research – such as communication, general management, leadership, and the administration of intellectual property. Conversely, students seeking research training are looking for courses which provide training in these broader areas as well as in the technical research areas of their immediate discipline. As training providers, the Go8 universities have to respond to this changing market demand and responding to them is likely to require students to spend a longer period in training.

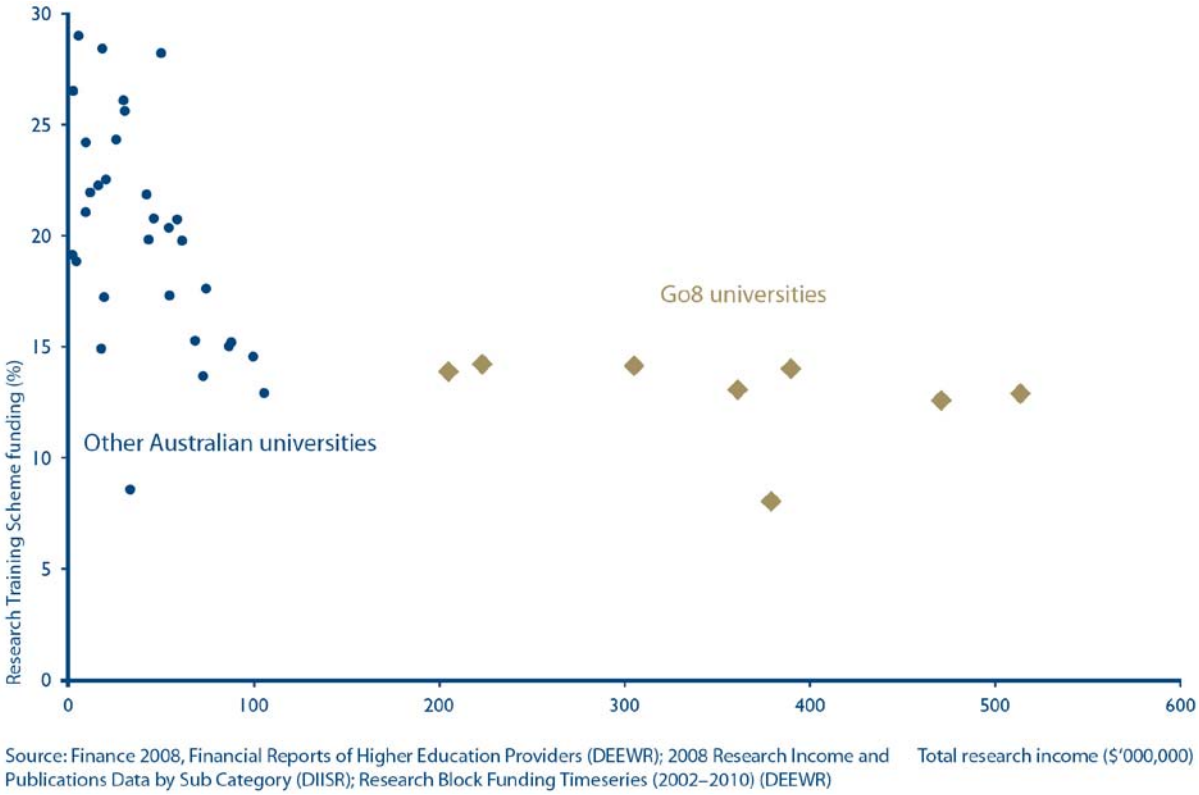
Improving the quality of research training – both the breadth and depth of training – requires additional funding. At present the RTS scheme does not provide sufficient funding for the training of research students and any increase in the number of students without increased funding would create major problems for universities. Cross subsidisation is becoming more difficult and government should not expect or require universities to provide a subsidy, given the critical need for more researchers and a broader research-trained workforce.

Universities can respond to the changing demands for quality research training only if they receive full funding for all the research training places they provide. Attracting the very best students to maintain the excellence of the student intake will also require additional funding. Potential research students face a wide array of often well paid opportunities that require a lesser degree of dedication than research training. Students should receive sustainable stipends that reflect their immediate needs but which also acknowledge the contribution they make to national wellbeing, both through the direct impacts of the research they perform and the contribution they make to increasing national capability and capacity.

Figure 2 shows the proportion of RTS funding received by each Australian university relative to their total research income. It is obvious that while Go8 universities earn by far the greatest amounts of research income, their relative proportion of RTS funding is very low compared to other Australian universities. This points to two issues of concern, one is that there is an under utilisation of Australia's research capacity in respect of research training and secondly, the current RTS distribution formula is not directing funding effectively to where there is scale in research activity.

Expanding the available pool of funding for RTS and IPRS schemes would allow universities to support additional students is necessary and should be priority action for government. However, it is essential that RTS allocations reflect the quality of the research environment. To this end the formula components should be revisited. A basket of indicators should include: research excellence through ERA as a base criterion for training HDR students, augmented by a range of other important indicators including number of HDR students; completion and attrition rates; student publications and other research outputs; quality of disciplinary training; quality of support for students including generic skills training and career services; quality of supervision; thesis quality; and student and employer satisfaction.

Figure 2: Research Training Scheme (RTS) funding as a percentage of total Australian university research income, 2008



Source: Finance 2008, Financial Reports of Higher Education Providers (DEEWR); 2008 Research Income and Publications Data by Sub Category (DIISR); Research Block Funding Timeseries (2002–2010) (DEEWR)

As discussed below, scale provides an important dimension of the quality of the training experience. A strategy to improve the quality of training will require the targeting of funding to support the scale of research activity necessary to provide effective research training in today's changing environment.

A further dimension of supporting a quality research workforce is ensuring the migration settings do not impose a barrier to Australia attracting and retaining high quality HDR students and researchers from overseas. A whole of government approach is needed to ensure a forward looking approach is adopted to support the recruitment of quality research students and academics, particularly in disciplines where shortages have been identified. The work of Skills Australia should be focused on this important area. And while we appreciate that under the current policy setting to halve the number of visa subclasses, it is unlikely a researcher specific visa will be developed, migration regulations should account for the importance of attracting highly skilled people into Australia.

Attrition rates for PhD training

The consultation paper suggests that actions to reduce the rate at which students leave PhD training would help increase the supply of research skills in the workforce. The Go8 recognises that high attrition rates can have national and individual consequences, not least being the opportunity costs involved in providing resources for someone who does not complete the training. However, we do not believe that the current attrition rates for doctorates for research in the Go8 universities are excessive at 6.5 per cent of first year enrolments. See **Table 1** below. These figures are based on attrition only one year from commencement. There is also attrition in later years, captured by the 17.5 per cent figure presented in the consultation paper. But, this figure is likely to be an

overestimation because students who do not receive their award in the same year they submit are counted in this attrition figure.

Table 1: First year attrition rate by course level – domestic students

		2002	2003	2004	2005	2006	2002-2006
Doctorate by Research	Go8	6.5%	5.9%	7.7%	6.5%	5.9%	6.5%
	Non Go8	10.3%	8.9%	10.1%	9.9%	9.3%	9.7%
	All universities	8.5%	7.4%	8.8%	8.2%	7.5%	8.1%
Masters by Research	Go8	14.1%	12.1%	13.1%	12.9%	14.4%	13.3%
	Non Go8	15.6%	13.6%	17.0%	16.6%	15.8%	15.7%
	All universities	14.8%	12.8%	15.0%	14.7%	15.1%	14.5%
Masters by Coursework	Go8	23.1%	21.7%	21.8%	21.7%	21.8%	22.0%
	Non Go8	26.7%	23.7%	23.7%	23.3%	23.8%	24.2%
	All universities	25.4%	23.0%	23.0%	22.8%	23.1%	23.5%
Other Postgraduate	Go8	24.2%	24.3%	20.8%	21.8%	23.0%	22.9%
	Non Go8	29.0%	27.8%	27.6%	28.1%	27.1%	27.9%
	All universities	27.6%	26.8%	25.6%	26.3%	26.0%	26.4%
Bachelor	Go8	14.5%	13.6%	12.7%	12.8%	12.7%	13.3%
	Non Go8	21.7%	21.0%	21.1%	20.8%	20.6%	21.0%
	All universities	19.9%	19.1%	18.9%	18.7%	18.5%	19.0%
Other Undergraduate	Go8	28.8%	29.9%	33.1%	28.2%	33.0%	30.4%
	Non Go8	31.2%	40.6%	44.5%	30.0%	25.8%	34.5%
	All universities	30.9%	38.9%	42.5%	29.7%	26.7%	33.9%
All course levels	Go8	18.8%	18.2%	17.3%	16.8%	17.0%	17.6%
	Non Go8	27.6%	26.5%	25.9%	24.6%	24.6%	25.9%
	All universities	25.2%	24.2%	23.5%	22.5%	22.6%	23.6%

Note: annualised rates for commencing students *Source: DEEWR 2010*

Even if the figures identified in the consultation paper were correct we would argue this does not represent an unreasonable level of inefficiency, given quality outcomes are the key objective of PhD programs. With the rigour required for the successful completion of a doctorate and high quality of the people, it is expected that a certain number of students would find employment or choose a different path before they submit their final dissertation. It also does not mean these people have not developed useful skills and attributes through their experience.

These numbers of attrition are also significantly lower than those in other leading research systems:

> *Despite the rigorous selection processes used for admissions into U.S. graduate schools and the high achievement level of those pursuing a graduate degree, some studies indicate that the attrition rate in doctoral education is as high as 40% to 50%.*[8]

Original research of the kind necessary to earn a doctorate is by its very nature open-ended. Outcomes are uncertain and interim results often unexpected, requiring significant changes in direction. Apparent dead ends are not uncommon and the research is frequently taking place in a highly competitive environment such that work by other teams can make an agreed work plan irrelevant. Those conducting such research need to combine a high level of imagination and creativity with the technical skills necessary to test the hypotheses they develop; and these with the stamina and objectivity necessary to collect the data they need to test the hypotheses they

[8] *The Path Forward*. Commission on the Future of Graduate Education in the United States. April 2010.

generate. Not everyone has the necessary combination of aptitudes, skills and values or will enjoy the intellectual and other challenges that research offers. However, this may not become apparent until someone has had direct experience of research.

Given the cost of research training, we need a system in which we can identify quickly those students who will not succeed, so that we can identify the career pathways that will better meet their needs. This will produce far better outcomes for the nation but also for the individuals concerned. Encouraging students who lack the necessary commitment and interest to complete training which does not suit their needs or inclination is unfair to them and potentially a waste of resources.[9] Moreover, it would be wrong to assume that students who do not complete their PhD training do not benefit from their exposure to research. The self awareness that results can be personally helpful while their improved understanding of research will stand them in good stead in other careers and be helpful for the organisations for which they subsequently work. Even a short exposure to a research culture can develop the curiosity that can help someone recognise the importance and potential of new technologies in a way that facilitates their adoption and adaptation.

Loss of trained workers at the post-doctoral and early-career researcher level may be more significant than that at the PhD training level. This is because of the investments already made in training and because people operating at this level have already demonstrated an interest in research and an aptitude for it. At the same time, however, it is important to recognise that people with research training can be playing vital roles in other parts of the innovation system, drawing upon the competencies and knowledge that flow from their research experience even when they are not performing research. Indeed, the effective functioning of an innovation system may well depend on people having higher degrees through research working in areas as diverse as venture capital, IP management and the development of business strategies.

Some movement away from research at the later career stages is inevitable because of personal career choices or performance. This should not be a cause for concern. Indeed, some people experimenting with other career choices may decide to return to research, providing additional value through their broader life/work experiences. Unfortunately, returning to research after prolonged breaks can in some cases present serious challenges. This can be the case for example when highly talented women leave the workforce to have children but then find significant barriers to their re-entry. There are a number of strategies that can help overcome these barriers. One is for employers to consider the merit of job or research grant applicants relative to the opportunity of the candidate to perform. For example, an assessment of a candidate's publication record could take into account periods out of the research workforce. In some cases, however this may not be sufficient given the rapid advances that take place in some areas of research. Responding to this issue might require targeted funding support to help those interested in joining the workforce again to catch up with the latest knowledge, trends and techniques. Providing such support would be more cost-effective than simply training new researchers, especially considering the value-added that can arise from broader, non-research experience. Providing more part-time opportunities might be another means of keeping highly trained people within the system.

[9] From this perspective the use of completion rates as a performance measure for RTS funding can act as a perverse incentive to encourage students to continue with training that might not suit them.

Attracting the highest quality students to undertake PhD programs is a more immediate issue than that of reducing attrition rates and might itself lead to a reduction in these rates. Problems in attracting the best students can relate to a wide range of factors, including the attractiveness of competing opportunities, especially in areas of high demand, and the perception that students can have about the impact of research training on their personal life and opportunities. At present committing to spend four years on PhD training can involve significant personal sacrifice, at least in financial and economic terms. The benefits that flow from personal development and the excitement of making a significant contribution through the advancement of knowledge may not be so readily apparent or appreciated.

Targeted funding to address scale issues

An important element of a research workforce strategy should be to target funding to ensure that research training takes place in an internationally competitive environment.

Quality research training has to take place in an environment that provides access to the best and most up to date equipment, the leading domestic researchers in the field and to networks involving the participation of the best researchers overseas. This requires a concentration of effort and support for effective networking and collaboration.

An effective research training environment should encompass research leadership in more than one field and preferably across a range of disparate fields. This is necessary to reflect the changes that have taken place in research funding and management processes over recent years; and the more complicated demands that research users are placing on research providers. In particular, research funding other than that supporting the advancement of knowledge in its own right increasingly focuses on outcomes, rather than disciplines.[10] One consequence of this is that research programs tend to be larger in scale and to bring together a range of disciplines and capabilities. This is because research aimed at achieving a particular outcome almost invariably requires the bringing together of a wide range of complementary skills and expertise. **A research program aiming to change rather than just understand the world has to address all aspects of the environment it is trying to change.** This is why major projects frequently bring together not just different areas of the natural sciences and engineering, but also the social sciences and humanities.

An effective research training program has to expose students to a breadth of research excellence across a wide range of disciplines, even when the students are not themselves working across these disciplines. Scale also facilitates exposure to more explicit and sophisticated research management processes and can provide a richer experience of working in teams. Except in particular instances (as with some research in the humanities) a researcher working in isolation or confined to narrow disciplinary boundaries cannot meet the demands society is placing on the research system.

An important consequence of these changes in the research environment is that spreading resources for research training thinly may result in students operating in less than optimal environments. If a training provider cannot offer both the scale and scope necessary to provide a training experience that is meaningful in terms of the demands of broader work environment, it will be failing its students. Moreover, it will find it difficult to attract the best students and certainly

[10] Researchers supported by the ARC and NH&MRC may not have a focus on particular outcomes but still consider the ways in which their research can have impact.

those students from overseas. This can itself reduce diversity and reduce the creative tensions necessary for a high quality research organisation.

One consequence of the need for scale and diversity in the research training environment, is that the research workforce strategy should target its funding at institutions capable of providing the necessary experience for students. Doing otherwise could result in Australia lacking world-class research training universities with the consequent negative effects that would flow to all other parts of the national innovation system. **Concentrating resources into world class institutes can help build national focal points that have international credibility and establish working linkages with important universities and research institutes overseas.** Such linkages can add to the richness and attractiveness of the research training experience, as well as help drive improvements in the quality of the domestic research effort.

Allocation of block grants

The consultation paper describes the primary vehicles of government funding for research training and the way in which the distribution of block grants takes into account completions, research income and publications. **The Go8 universities believe that for reasons that relate to but go beyond our research training responsibilities, fundamental change is necessary in the way that the Government allocates block grants.** We are setting out our broader position on this matter in a briefing for the incoming Government but provide a summary here. This is because funding and funding mechanisms are essential elements of any strategy to support excellence, improve quality and provide more effective outcomes from the Government's investments in university research, included those directed at research training.

In 1988 the Australian Government identified two principles to guide the funding of higher education research. These were selectivity (supporting the best wherever they are found) and concentration (targeting funding to strengthen capability to internationally competitive standards). The Go8 believes that these principles are still valid and should provide the foundation of all research funding. However, over recent years policy and program developments have emphasised selectivity and have paid insufficient attention to concentration.

As discussed in earlier parts of this response, the need to build significant focal points of national research expertise has become even more important given the more complex problems that researchers need to address, the imperative for multi- inter-, and trans-disciplinary research, and the increasing scale of international effort. Scale is important in increasing the international visibility of the research effort. Perhaps more importantly, it provides the potential to bring together researchers with diverse and complementary expertise who are able to interact in creative ways to initiate new approaches and thinking, develop new techniques, and achieve outcomes that would not otherwise be possible.

Good research training takes place in an environment of creative tension, continual debate and challenge, and builds on the synergies that result from the bringing together of different perspectives. This requires scale and around the world governments are seeking to concentrate their investments in world-class universities. As well as the direct benefits that flow from this concentration, they also capture the associated advantages such as the attraction of the best researchers from around the world and a reputation that creates the status, not least with international bodies, that is a prerequisite for influence.

Our incoming government brief on research provides a more detailed analysis of this issue, including information on recent developments and funding models in other countries. Suffice it to say here that as a result of the analysis we present in the brief, we recommend that:

- Government should maintain a binary model of research funding and provide universities with research block grants awarded on the basis of a quality assessment while using research funding councils to award competitive research grants which should have associated block grants covering their indirect costs.
- Block grants for research should cover the costs of academic staff salaries associated with research and the cost of research training. In addition, they should provide universities with the ability to strategically fund new research initiatives.
- The Government should continue its move towards the full funding of the indirect costs of research funded by the research councils. In doing this it should use a unique indirect rate for each university. This will allow for greater differentiation of research missions within the sector and would be consistent with international approaches.
- Government should continue to develop the ERA so that it can become the driver of government block funding for research. Refinement of the ERA should enable government to meet its principles of selectivity and concentration based on robust measures of research excellence as measured against international benchmarks.
- Universities and government should encourage researchers and research teams to organise themselves into hubs and spokes. This would concentrate resources in the most appropriate research centres and departments (the hubs) which would then provide scholars around the country (the spokes) access. Researchers engaged in high quality research but located in an institution with no critical mass in their research fields would benefit greatly from collaboration with institutions having the necessary critical mass and able to provide access to the best available infrastructure.
- Government should develop and put in place a coherent international research collaboration strategy. This should encompass a program to replace the International Science Linkages (ISL) program, a scheme to support the travel expenses of early career researchers, increased funding for the Australia-China Science and Technology Program and an expanded network of Science and Technology Counsellors.

Conclusion

The Go8 appreciates the significant efforts of the Government, DIISR and key stakeholders who have contributed to this process thus far. A number of important actions have been identified which, if adopted, would be positive steps in helping to build Australia's research capacity and would help Go8 universities in their future planning.

We also want to see a research workforce strategy that addresses the needs of the whole innovation system, aims to make Australia a world leader in technological and social advances and prepares us for the unknowable future.

The Go8 and its member universities want to continue to work with Government, both to develop the strategy further, and to implement measures which will deliver on the strategy.