



University of South Australia

Response to the questions raised in ‘*Meeting Australia’s research workforce needs*’ - a consultation paper to inform the development of the Australian Government’s research workforce strategy.

Executive Summary

The University of South Australia welcomes the opportunity to respond to the issues raised in the consultation paper, ‘*Meeting Australia’s research workforce needs*’.

A summary of the responses to each of the questions raised in the paper is provided below.

Q1: New Challenges facing Australia in adapting to the changing nature of employer demand and meeting its innovation aspirations.

Q1. Challenge: Supporting Research Training in Inter- and Multi-disciplinary Environments

There is an emerging challenge for research training institutions to support inter-and multi-disciplinary research environments given the focus of Excellence in Research for Australia and potentially Sustainable Research Excellence on mono-disciplinary excellence.

Q2: New Opportunities available to Australia to better respond to the changing nature of employer demand in Australia and meet national innovation aspirations. Delivering the ‘Engaged PhD’

2a Opportunity: Delivering the ‘Engaged PhD’

There are significant opportunities through the development of an ‘Engaged PhD’ training to value-add to a PhD candidature through development of both generic capabilities and specific workplace experiences which ensure that the PhD graduate is workplace-ready, whether that workplace is inside or outside academia.

2b Opportunity: A National Industry Innovation Scholarship Program

There are significant opportunities to align research training activity and the national innovation agenda through a National Industry Innovation Scholarship Program.

Q3: Challenges facing Australia in delivering required levels of research skills to its workforce over the next decade

3a Challenge: Scaling Up Investment in the Research Training Scheme in the Immediate Term

There is an immediate need to address the foreshadowed gap between demand and supply of researchers in the period 2011-2014.

3b Challenge: Definition of Robust Criteria for Research Training Quality:

Building a sustainable increase in research training capacity requires the development of robust criteria for a high quality research training environment through the auspices of Universities Australia.

Q 4: Opportunities available to Australia to enhance its supply of research skills over the next decade? What other opportunities should be considered?

4. New Opportunity: Ensuring the National Availability of Research and Innovation Skills

Building 1000 World Class Research Concentrations to ensure the provision of the next generation of research and innovation leaders is not limited to a narrow geographic region, specific institutional type or a limited range of disciplinary-focussed research.

Q5: Challenges facing Australia in providing productive and viable career paths to its researchers over the next decade and promoting them adequately

5. Challenge: Promoting Engagement of Researchers at Different Career Stages in the Global Academy

There is a need for a systematic and coordinated approach to the engagement of Australian research students and research competitive academics in the 'global academy', targeting doctoral students and early- and mid-career researchers, and with a focus on the development of international collaborations in addition to travel to international conferences and meetings.

Q6: Do the issues identified adequately capture the opportunities available to Australia to better support researchers at the different stages of their careers over the next decade? If not, what other opportunities should be considered?

6. Opportunity: Establish a national professional body to support the career requirements of the 'Research and Innovation Professional'

A professional body should be established which would have oversight of the requirements, work conditions and accountability of the 'research and innovation professional' and which would communicate the high value of all professional research and innovation career streams.

Q7: Are the priority areas for action outlined in Table 1 the right ones? What other priorities should be identified?

Q8: Does the allocation of responsibilities for priority areas and actions outlined in Table 1 adequately capture the respective roles of relevant parties? Are there any issues relating to the allocation of responsibilities that need to be considered?

Q9: Are the timeframes outlined in Table 1 appropriate? Are there any priority areas that require more immediate or longer-term action?

Q7-9: We propose that:

- a. **There should be development of a clear communication framework and plan for engagement (2011-2013) on the issues raised in the discussion paper with Universities Australia, NHMRC, ARC and peak industry groups.**
- b. **An immediate term increase e.g. 10% in 2011/2012 in investment in the RTS to address the foreshadowed gap in demand and supply for research trained graduates in 2011-2014.**
- c. **The inclusion of the requirement to consider appropriate measures of research excellence, engagement (e.g. JRE) and research training capacity in the review of the RTS flagged for the short term.**
- d. **That consideration be given to the capacity to promote engagement of researchers at different career stages in the global academy in the development of initiatives and programs related to the internationalisation of research.**
- e. **That a discussion occur in 2011 with early and mid career researchers on whether their membership of longer term program grants enhances or limits perception of their research independence.**
- f. **Further consultation is required on the objective of including student publications in ERA.**

Background

Q1: Do the issues identified adequately capture the challenges facing Australia in adapting to the changing nature of employer demand and meeting its innovation aspirations over the next decade? If not, what other challenges should be considered?

1. Supporting Research Training in Inter- and Multi-disciplinary environments

There is an emerging challenge for research training institutions to support inter-and multi-disciplinary research environments given the focus of Excellence in Research for Australia (ERA) on mono-disciplinary excellence.

Building a knowledge-based economy requires a highly educated workforce and will require an increasing number of PhDs, the vast majority of whom will be educated here in Australia. There are significant changes occurring in all professions around the nature of professional work. For example, in engineering, future developments could see much routine engineering work being sourced from China, India or Russia with the challenge for countries such as Australia being to add high value to products through integration of concepts in design and innovation. This will require professionals trained in an education system infused with research and innovation and exposed to how major cross-disciplinary problems are tackled successfully through innovative practice (e.g. the iPhone, MIT media labs etc).

The Danish Business Research Academy and the Danish Forum for Business Education in their August 2008 publication 'Thinking across disciplines - interdisciplinarity in research and education' emphatically state the national imperative for interdisciplinarity: *'On average, interdisciplinary communities have double the outside funding as do monodisciplinary communities... The results say something about the quality of the interdisciplinary research and about the fact that interdisciplinary research communities are attractive communities for investment.'*¹

It is therefore important to ensure that there is an alignment of the national drivers required to grow a vibrant research training environment and the funding allocation mechanism. For instance, the foreshadowed Excellence in Research for Australia (ERA) exercise emphasises the primacy of performance of individual staff in a discipline as a measure of research excellence. Whilst ERA will provide a lagged view of the strength of research disciplines in an institution during the previous 6 years, it will not provide an insight into the current health of disciplinary, interdisciplinary or cross disciplinary research activity in institutions. This can be a significant issue when institutions are growing their research activity base (ie are not in steady state) and when research questions of major national priority (such as climate change adaptation, combating the obesity epidemic etc) are ones on which the next generation of researchers should be engaged.

There is a risk that the rewards for institutions to support the pursuit of excellence in discipline specialisations through ERA and Sustainable Research Excellence (SRE) funding will be significantly greater than those for supporting researchers engage in multidisciplinary research and collaborations with industry and other end user partners. This could have inadvertent negative consequences for the training of researchers in emerging areas of global importance.

¹ http://fuhu.dk/filer/DEA/Publikationer/08_aug_thinking_across_disciplines.pdf

Q2: Do the issues identified adequately capture the opportunities available to Australia to better respond to the changing nature of employer demand in Australia and meet national innovation aspirations? If not, what other opportunities should be considered?

2a Opportunities: Delivering the 'Engaged PhD'

There are significant opportunities through the development of an 'Engaged PhD' training to value-add to a PhD candidature through development of both generic capabilities and specific workplace experiences which ensure that the PhD graduate is workplace-ready, whether that workplace is inside or outside academia.

While not detracting from the need to develop deep disciplinary expertise, there are significant opportunities to value-add to a PhD candidature through development of both generic capabilities and specific workplace experiences which ensure that the PhD graduate is workplace-ready, whether that workplace is inside or outside academia. It is time for Australia to consider investment in 'The Engaged PhD' as a means of building collaborations, partnerships and work-readiness across a broader spectrum of employment situations, whilst supporting the recruitment of a new generation of innovators and leaders to contribute to the future economic and social fabric of Australia. This model of a PhD does not trade excellence in the individual or project; it builds on the calibre of the student and the supervisor to drive the innovation agenda, an agenda that increasingly must value partnership with non-university organisations and the development of broader skills in the candidate.

An 'engaged' PhD would offer the doctoral student more formal opportunities through the course of their degree to engage in workplaces of direct relevance to their future career and require them to spend periods of time outside of their own institution. Opportunities could include engaging in the classroom as an 'academic in training', engaging with relevant industry organisations, government departments and business partners, or engaging in international research and R&D environments. It should be noted that the elements of such programs are already in place for many CRCs, where students receiving financial support from the CRC often work in industry contexts, attend workshops with industry leaders and develop a network of employment opportunities in that industry for access on graduation. Compact discussions between universities and DIISR could allow each university to outline which elements of engagement in its doctoral training program fit with its mission (regional, national and international), to specify the contribution of the institution to building Australia's research and innovation workforce and to explicitly describe the institutional strategy to include engagement opportunities for its doctoral graduates.

2b New Opportunities: A National Industry Innovation Scholarship Program

There are significant opportunities to align research training activity and the national innovation agenda through a National Industry Innovation Scholarship Program

It could be timely to consider developing a *National Industry Innovation Scholarship Program* which would include support for up to a total of 500 National Industry Innovation PhD Scholarships recruited during a 5 year period, with a \$30,000 p.a. stipend for each of 4 years in areas designated as important for the future of Australian industry sector. The National Industry Innovation Scholars

would be supported as a cohort and would engage in industry-led or exploratory strategic projects supported by an Industry Innovation Scholar Professional Development Program designed to provide industry context, connection and the potential for employment on graduation. As an example, up to 50 of such Scholarships could be awarded in the automotive industry over the 5 year period for students from a range of disciplinary backgrounds able to contribute to the innovation agenda required to transform the automotive industry (such as in projects aligned with the Green Car Innovation Fund) and with a nominated university/public research agency and industry supervisor. The final number of scholarships would be determined through research workforce road-mapping exercises within each industry sector. The exact way to allocate innovation scholarships needs careful consideration, but it is possible a companion scheme to ERA, Excellence in Innovation Australia (EIA), could be developed and scholarships allocated on the basis of that as well as on JRE performance funding. The development of EIA could perhaps be informed by the outcomes of the now ongoing pilot project on Assessment of Impact that is being conducted in the UK or by the sophisticated work of the Leiden group that includes, amongst other things, the number of publications co-authored between university and industry employees.

Q3 : Do the issues identified adequately capture the challenges facing Australia in delivering required levels of research skills to its workforce over the next decade? If not, what other challenges should be considered?

3a Scaling Up Investment in the Research Training Scheme in the Immediate Term:

There is an immediate need to address the foreshadowed gap between demand and supply of researchers in the period 2011-2014.

As highlighted in the discussion paper, the supply of researchers is an area of serious concern for Australia and many more will be needed to alleviate that concern. Current levels of RTS funding have not been increased significantly in the Budget going forward, from \$603m in 2009/10 through to \$673m in 2013/14 - \$70m over five years, a 2-3% increase per year.

The results of the Access Economics report, *Australia's Future Research Workforce: supply, demand and influence factors* show that under those scenarios where Australia is performing particularly strongly, there will be a shortage of researchers and that this occurs in the immediate period from 2011. The high growth scenario, with strong international collaboration and export markets, and the innovation economy scenario, with R&D activity rising in line with the government's aspirations, both see a significant shortage of qualified individuals to drive that activity.

It is clear, therefore, delaying additional investment in the RTS until 2014-2016 seriously underestimates the challenges faced currently by universities seeking to contribute to growth in the HDR cohort. At current levels of funding domestic HDR training is a marginal activity, and with a growth strategy in mind this can only further dilute the available funding resources. A strong and relevant funding structure will effectively contribute to the overall success of the strategy.

3b Definition of Robust Criteria for Research Training Quality:

Building a sustainable increase in research training capacity requires the development of robust criteria for a high quality research training environment through the auspices of Universities Australia

Currently there is no accepted key criterion for where doctoral training should be performed and for how well it is likely to be performed. It has been suggested that measures derived from the ERA exercise could help serve such a purpose. There is now broad understanding across the sector that while ERA measures are likely to provide a view of research strength in specific disciplinary fields in different institutions, it has not been designed to focus on the full suite of features of a research environment which are important for high-quality research training, including multidisciplinary. Furthermore because of its decade 'long shadow' of both retrospectivity and forward application, it does not allow a full view of the present or potential research strength of an institution which is relevant for research training. It is relevant to note that the RAE after more than 20 years of application in the UK has not been used to regulate the provision of HDR training except through the opportunities that increased RAE funding provides an institution for enhancing its PhD training capacity. Any assessment has to be dynamic, and while elements of ERA almost certainly will be

useful in contributing towards an understanding of what constitutes an appropriate training environment, it was not designed to serve such a purpose on its own.

Consideration needs to be given to how universities can provide the very best environments for quality research training programs. It would appear this will require examination of at least three issues:

1. The quality and the capacity of the Institutional research environment and infrastructure including a facts-based assessment of how individual environments can provide a quality environment either within the institution alone or in partnership with national and international collaborators –recent success in attracting research funding through categories 1 to 4, prestigious fellowships and publication outputs are potential useful measures.
2. The quality of HDR programs including methods training and the integration of and opportunities for transferable skills development in research degree programmes; international experience for HDR candidates. A set of PhD attributes could focus effort.
3. Assessment of the educational outcome:

We also note that the appropriate body to have oversight of the development of such criteria is Universities Australia.

Q 4: Do the issues identified adequately capture the opportunities available to Australia to enhance its supply of research skills over the next decade? If not, what other opportunities should be considered?

4. Ensuring the National Availability of Research and Innovation Skills:

Building 1000 World Class Research Concentrations to ensure the provision of the next generation of research and innovation leaders is not limited to a narrow geographic region, specific institutional type or a limited range of disciplinary-focussed research.

The Discussion Paper outlines a clear case to build the scale of provision of research trained graduates. If Australia is to ensure that the provision of the next generation of research and innovation leaders is not limited to a narrow geographic region, specific institutional type or a limited range of disciplinary-focussed research, a broad suite of universities must be engaged in PhD training². It is indisputable that PhD training should only take place in high-quality environments. Institutions will therefore face strategic decisions about how to meet agreed requirements in specific research areas. This issue and that of geographical spread can possibly best be addressed through the concept of world class research concentrations.

A sustainable approach to building high class research training hubs to result in enhanced spill-over of global knowledge across Australia **would be to aim to build up to 1000 world-class research concentrations**, and ensure that national funding strategies do not discourage the emergence of such meritorious concentrations wherever they are located – either institutionally or regionally. Such world-class research concentrations could play a lead role in developing exemplar programs for the training of the next generation of research and innovation leaders. It is inevitable that institutions will be differentiated by the number of world-class concentrations they can maintain and manage to build. Some institutions may manage to create only very few world-class concentrations, others perhaps readily in excess of 50. However, it is arguable that a dynamic system in which individual institutions can build such concentrations will create the best overall capacity for Australia in terms of innovative capacity, competitive drive to perform at the highest level and ability to differentiate.

² The report, *'The Race to the Top: A Review of Government's Science and Innovation Policies'* (Lord Sainsbury of Turville October 2007), concluded that *"the paradox is that while innovation is a global phenomenon, the role of regions as the critical nexus for innovation based economic growth has increased"*. Universities have a critical role to play in the transfer of global knowledge to local and regional industry, business and other external stakeholders. This is a key point in the development of any national research training strategy which is focussed on harnessing the capacity of strong research groupings to build regional economies.

Q5: Do the issues identified adequately capture the challenges facing Australia in providing productive and viable career paths to its researchers over the next decade and promoting them adequately? If not, what other challenges should be considered?

5. Promoting Engagement of Researchers at Different Career Stages in the Global Academy

There is a need for a systematic and coordinated approach to the engagement of Australian research students and research competitive academics in the ‘global academy’, targeting doctoral students and early- and mid-career researchers, and with a focus on the development of international collaborations in addition to travel to international conferences and meetings.

One of the critical elements of building an understanding of the ‘global academy’ within any discipline, and research engagement with members of that academy, is participation in an international conference with peers. This is particularly important early in a research career, during doctoral training or in the first five years of an academic appointment. These are periods when students and new academics are faced with significant financial, academic and family commitments that can limit their ability to engage in overseas conferences or visits to the leading research practitioners in their field. Whilst many institutions run programs to support the international research engagement of Higher Degree by Research students and new academics, these programs are limited by the necessity to maintain the delivery of academic programs and by the capacity to fully fund such visits. There is a need for a systematic and coordinated approach to the engagement of Australian research students and research competitive academics in the ‘global academy’, targeting doctoral students and early- and mid-career researchers, and with a focus on the development of international collaborations in addition to travel to international conferences and meetings. It is also the case that hosting high profile research meetings in Australia brings the world’s best to meet our graduates and researchers and result in the initiation of significant international collaborations.

Finally a critical phase of any PhD is in the examination of the thesis by international peers. Examination of an Australian thesis by world leaders in the field results in an appreciation of the high quality of Australian research and job offers for doctoral candidates. In this context, it is important that Australia supports its brightest and best students to take up the opportunity to work overseas before returning to Australia. Schemes such as the NHMRC CJ Martin Fellowship scheme which provide funding for competitively selected postdoctoral trainees to spend 2 years working overseas before returning to Australia for a further 2 years should be expanded across all discipline areas.

Q6: Do the issues identified adequately capture the opportunities available to Australia to better support researchers at the different stages of their careers over the next decade? If not, what other opportunities should be considered?

6. Establish a national professional body to support the career requirements of the 'Research and Innovation Professional'

A professional body should be established which would have oversight of the requirements, work conditions and accountability of the 'research and innovation professional' and which would communicate the high value of all professional research and innovation career streams.

One of the difficulties in the recruitment of Australia's brightest and best students to engage in research training and in research is that research is not viewed as or constitutes a 'profession'. Currently Australia's brightest and best students routinely look to the professions of law, medicine, and engineering etc rather than aspire to be 'a researcher' in academia, industry or government. If any workforce plan is to deliver the desired outcomes for an innovation system, it is time to change the ad hoc approach to the recognition and valuing of the research career. Currently there is no formal post doctoral career path and as highlighted in the discussion paper graduates with some 10 years of training are routinely employed on successive short term contracts resulting in high wastage to a range of other career roles in times of high employment.

A representative body of research professionals with specialist chapters for specific disciplinary areas such as science, health or social science could monitor workforce capacity in areas of strategic importance for Australia's innovation agenda, have oversight of career progression milestones and ensure research training systems deliver the appropriate skills required. Importantly the establishment of such a professional body would provide recognition of the status and importance of research as a career path for bright and ambitious young Australians.

Q7: Are the priority areas for action outlined in Table 1 the right ones? What other priorities should be identified?

Q8: Does the allocation of responsibilities for priority areas and actions outlined in Table 1 adequately capture the respective roles of relevant parties? Are there any issues relating to the allocation of responsibilities that need to be considered?

Q9: Are the timeframes outlined in Table 1 appropriate? Are there any priority areas that require more immediate or longer-term action?

Q 7-9: In relation to the actions cited in Table 1 we propose:

- a. There should be development of a clear communication framework and plan for engagement (2011-2013) on the issues raised in the discussion paper with Universities Australia, NHMRC, ARC and peak industry groups.
- b. An immediate term increase' e.g. 10% in 2011/2012 in investment in the RTS to address the foreshadowed gap in demand and supply for research trained graduates in 2011-2014
- c. The inclusion of the requirement to consider appropriate measures of research excellence, engagement (e.g. JRE) and research training capacity in the review of the RTS flagged for the short term.
- d. That consideration be given to the capacity to promote engagement of researchers at different career stages in the global academy in the development of initiatives and programs related to the internationalisation of research
- e. That a discussion occur in 2011 with early and mid career researchers on whether their membership of longer term program grants enhances or limits perception of their research independence.
- f. Further consultation is required on the objective of including student publications in ERA.