# Submission to the Review of Australia's Research Training System

## Executive summary

The Australian PhD is an internationally recognised qualification. At its foundation is the completion of a significant research project that contributes to Australia's research productivity. This core must be retained, but innovation in research training is needed to ensure that Australia's Higher Degree Research (HDR) graduates remain internationally competitive and are prepared for life-long employment inside or outside of the higher education sector.

Achieving satisfactory training for a range of employment outcomes requires flexibility: in the palette of discipline and transferrable skills training from which candidates can choose; in how scholarships are awarded, for what length and at what rate; and in the qualifications graduates can obtain. To achieve this flexibility, the University of Melbourne makes the following recommendations for the reform of research training:

1. The rules governing the Australian Postgraduate Award (APA) scholarship should be amended to allow scholarships to be awarded for the duration of Research Training Scheme places, and to recognise entry to HDR courses based on capability and/or through paths other than an Honours degree.
2. More clearly articulated research training pathways, with a series of exit points could provide the flexibility needed to meet the research capability needs of small to medium enterprises, without compromising the training needed for doctoral graduates.
3. The successful Commercialisation Training Scheme, which was discontinued in 2011, should be reinstated to provide HDR with skills in business acumen and commercialisation of research.
4. An additional loading should be paid for HDR completions by indigenous students to assist universities to expand indigenous HDR student support services.
5. Extending longitudinal graduate outcome surveys to 5 and 10 years would provide better information on graduate destinations and to inform policy direction for research training.
6. Providing targeted incentives for employers to engage with HDR students through the R&D Tax Incentive Scheme would drive greater industry–university collaboration.

A discussion of how adjusting research training settings can increase Australia's innovation and research capacity cannot occur in isolation. Separate reviews underway of research funding, research infrastructure and taxation reform must be brought together to achieve an holistic, coordinated framework within which research training sits.

The University of Melbourne broadly supports and has contributed content to the Group of Eight and Australian Council of Graduate Research submissions.

# Producing high quality researchers

1. **What are the research skills and experiences needed to be an effective researcher?**
2. **What broader transferable qualities do HDR graduates need to develop to succeed in a wide range of career pathways? Should these skills be assessed, and if so, how?**
3. **What other broader capabilities should HDR graduates develop during their research training?**

The ability to tackle previously unseen problems is what defines a researcher, and what separates a PhD from earlier degrees. The core research skills of being able to identify a problem, develop an appropriate methodology, critically appraise previous work, obtain and analyse data appropriately and interpret and communicate the results is what defines research training. Essential enablers of this process are an advanced understanding of the discipline, effective self and inter-personal management, project management and a practical understanding of research ethics and integrity.

The University of Melbourne (UoM) articulates these desired outcomes in its doctoral attributes.[1]

The research experiences that should be encouraged for all candidates include publication of the research output (be they traditional or non-traditional), presentation at seminars and conferences, international experience and research collaboration.

Frameworks of the research and transferable skills required of HDR graduates have been developed internationally,[2] and employer needs for transferable skills have been surveyed in Australia.[3] These transferable skills include:

- Effective communication - in all its forms and to a variety of audiences
- Team work and networking
- Project management (planning and organisational skills)
- Effective self-management
- Financial and budget management
- Leadership training
- Commercial acumen and commercialisation skills
- Client and collaborator engagement.

Other skills specific to particular career destinations include teaching and curriculum development, business case development and grantsmanship and intellectual property management.

Some training is provided in these skills areas at UoM through formal (graduate) certificate courses (eg Graduate Certificate in Advanced Learning and Leadership (GC-ALL),[4] Melbourne Teaching Certificate for Graduate Researchers (MTCGR)[5]), self-assessment of skills acquired during

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[1] http://gradresearch.unimelb.edu.au/roles-and-responsibilities/meeting-expectations

[2] The Vitae Researcher Development Framework, https://www.vitae.ac.uk/researchers-professional-development/about-the-vitae-researcher-development-framework/

[3] The Allen Consulting Group (2010). *Employer demand for researchers in Australia*, Report for DIISR. http://www.industry.gov.au/research/ResearchWorkforceIssues/Documents/EmployerDemandforResearchersinAustraliareport.pdf

[4] http://www.cshe.unimelb.edu.au/prof_dev/grad_researchers/gcall/

[5] https://cshe.unimelb.edu.au/prof_dev/uni_teachers/mtc/mtc_grad_res.html

candidature (eg Doctoral Attributes Workshop[6]), and by extending access to financial management subjects delivered in the Faculty of Business and Economics to HDR candidates across the University. The reach of certificate courses is limited by the number of Commonwealth Supported Places (CSP) that can be directed to them and demand far outstrips supply.

Commercialisation training[7] was provided through the Federal Commercialisation Training Scheme (CTS) until it was disbanded in 2011. Training was offered in the form of a Graduate Certificate in Commercialisation for Research Students, provided by the Melbourne Business School. The School acted as a hub for other universities to deploy their CTS allocation.

*Assessment*

Written communication and critical reasoning is assessed via the thesis and, in the case of the creative arts, by the associated creative outputs. In this respect, the contribution of HDR graduates to the creative arts is not fully acknowledged as creative outputs are excluded from HERDC data collection. Improving public access to theses via institutional repositories is one way in which graduates' research capabilities can be demonstrated to potential employers.

At UoM, oral communication skills are critiqued at least twice during candidature: at the confirmation seminar and at a public completion seminar, the latter being a pre-requisite for thesis submission.[8] The completion seminar demonstrates the candidate's knowledge and is assessed by a panel which gives written feedback. It provides the benefits of collegial exchange and, to some extent, the sense of closure referred to in the review discussion paper. This seminar could be formalised further to provide the rigour of a viva voce, but attention is needed to ensure the desired outcomes can be achieved without incurring significant additional unsupported costs to the sector. Students enrolled in jointly awarded degrees typically do complete a formal viva.

Other demonstrated communication skills (eg 3MT participation, or conference presentations) can be conveyed to employers via a curriculum vitae (CV), as could participation in mentor programs such as IMNIS – Industry Mentoring Network in STEM.[9]

Several faculties at UoM have introduced formal coursework requirements into their PhD programs to increase discipline knowledge, provide methodological skills training and to improve the cohort experience. The subjects are formally assessed and are a hurdle requirement for progression to confirmed candidature. Evidence of completion of the GC-ALL and MTCGR are also provided via a transcript.

Participation in internship schemes could be demonstrated on a transcript, if a satisfactory mechanism to provide them as a subject within the PhD or as an adjunct certificate can be achieved.

Other transferrable skills training can be assessed qualitatively and evaluated by self-reflection and discussion with the advisory panel at the annual or biannual progress review.

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[6] https://cshe.unimelb.edu.au/prof_dev/grad_researchers/GReP/index.html
[7] http://www.gradskills.anu.edu.au/graduate-certificate-commercialisation-university-melbourne
[8] Examination of Graduate Research Students Procedure, https://policy.unimelb.edu.au/MPF1262#section-3.1
[9] http://www.atse.org.au/content/industry-mentoring-network-in-stem-imnis.aspx

A light touch to assessing transferable skills is recommended. HDR candidates' performance is evaluated at regular intervals, and the production of a thesis (whether by a series of publications or monograph) can be daunting. Placing students under additional examination pressure carries risks for student wellbeing and completions.

It should also be noted that research training activities provided through Australian central graduate schools are internationally benchmarked by the various peak organisations such as the Council of Graduate Schools (US) and Vitae (UK).

## Contributing to Australia's future prosperity and wellbeing

**4. What skills and capabilities do employers in Australia need from HDR graduates?**

A satisfactory answer to this question requires a clear view of who employs HDR graduates immediately and 3–5 years post completion. Forty-one per cent of 2013 HDR graduates working full time were employed in the higher education sector (HES).[10] This compares with 53% of the UoM 2015 commencing cohort who are seeking a role in HES, either in a research, teaching or professional role (Further information: Table 1).

A survey of STEM employers in 2013 showed that the majority of STEM-related doctorally qualified staff were employed in R&D activities (20.6%), professional services (20.5%) and leadership and management (18%). Unfortunately analysis of the role of HDR graduates by industry was not possible due to sample size limitations.[11]

Data on career destinations 5 years post completion is patchy at best. Plans to introduce the Graduate Outcomes Survey (GOS) and GOS Longitudinal (3 years post completion) are welcome, but further coordinated follow up of graduates at 5 years and 10 years would provide a clearer view of HDR career paths and assist higher education providers in responding to changing market requirements. The Graduate Longitudinal Study New Zealand provides a potential model for this survey.[12]

While the number of graduates who remain in the HES diminishes after initial employment, the sector - which is a leading export earner for Australia - will remain a key employer of HDR graduates in the medium term.

Workshops conducted by the Business/Higher Education Round Table in 2012[13] concluded that:

- (Business) Employers value teamwork and strong analytical and critical thinking skills in current HDR graduates. Skill sets in data analysis, predictive modelling and decision-making

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[10] Graduate Careers Australia, Postgraduate Destinations 2013 http://www.graduatecareers.com.au/wp-content/uploads/2014/09/Postgraduate_Destinations_2013_FINAL.pdf

[11] Deloitte Access Economics (2013) Australia's STEM workforce: a survey of employers. http://www.chiefscientist.gov.au/wp-content/uploads/DAE_OCS-Australias-STEM-Workforce_FINAL-REPORT.pdf

[12] Graduate Longitudinal Study New Zealand, https://www.glsnz.org.nz/about/

[13] Business/Higher Education Round Table (2012) Research skills for an Innovative Future: Business Views and Needs – Final Report. http://www.bhert.com/activities/2012-research-skills-for-an-innovative-future

are also highly sought after and there was consensus from workshop participants that this demand is expected to continue to increase.

- Work across business and academia is increasingly being undertaken in multi-disciplinary teams which require a broad range of communication, interpersonal and negotiation skills that build effective engagement with external stakeholders.

- There are cultural differences between the business and academic environments and HDR graduates need to be able to operate comfortably in both.

The results above indicate that business employers value the deep, sustained research activity that is central to growth as a researcher. It can be argued that the STEM HDR in Australia intrinsically provides excellent fundamental skills in problem or question definition, resource accrual, technical development, experimentation, data collection and analysis, and reporting. Similar but different skills may be acquired during a HDR in the HASS disciplines, but with an emphasis on qualitative research, argument development and advanced writing skills.

More training in transferable skills is warranted. Communication, formal project management and leadership are part of the key attributes that should be acquired by all HDR graduates. Communication and project management capabilities, understanding of non-academic organisations, their systems and behaviors, and the value of interdisciplinary approaches to problem solving through immersion or group activity should be provided (eg GC-ALL,[14] Melbourne, iPrep WA[15]). Some of this teaching was provided through the now disbanded CTS.[16]

The CTS should be restored as a key element of expanding research training engagement with industry, with the format for support to be developed in consultation with the Australian Council of Graduate Research to avoid problems in execution.

The ability to engage with industry and access industry support will be important for graduates whether they find a career in industry or academia.

With regards to the discipline/technical skills required in the foreseeable future, Deloitte's recent *Positioning for Prosperity? Catching the next wave*, suggests that there are five sectors (gas, agribusiness, tourism, international education and wealth management) that will provide an additional $250 billion to the Australian economy over the next 20 years.[17] These relatively new business revenues will be added to those generated through traditional export strengths in food and fibre production, mineral extraction and processing, medical biotechnology and regional finance, and to the domestic economic job drivers of healthcare, professional and business services and construction.[18]

ACOLA's discussion paper notes that National Science Priorities are subject to review biennially, which is twice as rapidly as it takes to produce a doctoral graduate. An agile response to changing

[14] http://www.cshe.unimelb.edu.au/prof_dev/grad_researchers/gcall/
[15] http://www.waresearch.com/#!iprepwa/mainPage
[16] http://www.gradskills.anu.edu.au/graduate-certificate-commercialisation-university-melbourne
[17] http://www2.deloitte.com/au/en/pages/media-releases/articles/25-reasons-confident-about-growth-240314.html
[18] http://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Pages/Australian-Industry-Report.aspx

market demand requires ongoing research expertise in many areas, which can be scaled up as needed. Good research training requires an excellent research environment. UoM provides HDR training in 141 4-digit Field of Research (FoR codes; see Further Information Figure 1 for student distribution by 2 digit FoR). Of those students for whom a FoR has been captured (93% of the cohort), more than three-quarters (77%) are enrolled in disciplines where UoM was assessed as being above or well above world standard in ERA 2012.

The specific skills required for HDR graduates to transition rapidly into non-academic roles depends very much on the industry to be supported. An HDR entering the medical technology sector may require a deeper understanding of the regulatory processes for medical devices whereas an HDR servicing wealth management may need quantitative, financial and compliance-based training. The provision of a rich palate of allied training from which HDR candidates can select will be more effective than attempting to provide all HDRs with similar skills.

Candidates will need to be able to choose training from a variety of sources including from universities' offerings (eg business schools, communications units, entrepreneurial areas, legal services including IP training), from industry through immersive or communicated activities and from external sources – domestic and international. This flexibility must include an extension to the scholarship component of research training (ie to 4 years) and in funding the additional training requirements (for example through a reintroduced CTS).

### 5. What research skills and capabilities are needed to ensure Australia's research system remains internationally competitive?

The profile of Australia's industry differs from many of the leading manufacturing economies (eg Germany) and the dominance of sectors with limited technology reach such as financial services and mining has meant that the research funding segment is less evolved. In Germany, there are separate research organisations supporting 'blue sky' research (eg Max Planck), key research infrastructure and national problem-orientated research (Helmholz), research in cultural studies (Leibniz) and industry conversion of research into products and technologies (Fraunhofer). Added to agencies with the specific missions of funding University research (eg DFG) and mobility (DAAD), the German research ecosystem provides a sophisticated, end-to-end cover of the innovation process, and hence multiple points for engagement by the research training cohort. It is no coincidence that many more German HDR candidates enter research training with the explicit desire to work in industry, not the academy.

The US offers another highly evolved research ecosystem where government support is more directly replaced by venture capital, large company investment and philanthropy. The huge spectrum in quality and mission of the US tertiary sector means that HDR candidates have the opportunity to compete for a myriad of opportunities. For example, at MIT, many of the students are provided a stipend and co-supervision from a company, not the University, as a routine matter of course. Entrepreneurial development facilities are provided in much less developed economies like India eg IIT-Madras' incubator which is providing 6000 jobs in two large buildings adjacent to the university campus. Likewise the large and growing technology park adjacent to Tsinghua University

in Beijing is a site catalysed by research training activity. These ready/facilitated access incubators are rare in Australia outside of the highly successful programs like the Melbourne Accelerator Program[19] and Bio21[20] hosted by the University of Melbourne.

The Department of Industry's own analysis[21] suggests that Australia's research and development (R&D) performance as a percentage of gross domestic product (GDP) is internationally competitive through the lens of government investment, either directly or indirectly through higher education, but there is a growing disparity between business investment in R&D in Australia with that of competitor countries like Germany and the US.

The R&D Tax Incentive Scheme comprises approximately 30% of the Government's inputs into research and it is not clear how much of this $2.9B is used in support of research training (noting that the Scheme has been running for a short time only and available data is limited). Ensuring incentives through the R&D Tax Incentive Scheme to engage with HDR students should help to drive greater HDR–industry engagement.

### 6. What research skills and capabilities are needed from HDR graduates to ensure Australia is ready to meet current and future social, economic and environmental challenges?

One important value of the deep, sustained research activity conducted during research training is to explore leading edge solutions to current problems. HDR candidates must be able to identify, read and critique the relevant research literature and attend international meetings where new technologies are discussed to assist in this ideation. Access to the best available online resources is a given. Research and hence research training is no longer a domestic activity. Graduate researchers must be able to access the international talent pool to help mediate the generation and testing of ideas, to explore commercialisation funding beyond Australia's limited reach and to engage with peers in the developed and rapidly developing research world. Beyond attending conferences, Australian HDR must be able to undertake some component of their research training in an international institution, if the institution can add value to the candidates' program.

Many of the innovation-specific research skills will be acquired outside of Australia as Australia accounts for less than 2% of global research outputs.[22] Australia currently has approximately eight researchers per 1000 people explored, a number that compares poorly with Japan and Sweden (10/1000), Korea (12/1000), Denmark (14/1000) and Finland (15/1000). These researcher numbers are reflected in the percentage of GDP spent on R&D. Clearly, if Australia is to compete successfully at the innovation end of the wealth creation chain, it will need to increase the numbers of researchers and facilitate access of these additional HDR graduates to global networks of expertise - it is an issue of both quality and quantity of HDR.

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[19] http://themap.co/
[20] http://www.bio21.unimelb.edu.au/
[21] http://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/IndustryMonitor/section2.html
[22] Australian Benchmark Report 2015, Australian Trade Commission

The skills of Australian HDR graduates could be improved with the addition of sufficient training and travel support, but attention must also be paid to the numbers of researchers, which must be increased if Australia is to compete for competitive solutions and IP. Further, a proportion of these additional researchers should be encouraged to contribute to multidisciplinary projects, in multinational networks, if Australia is to remain competitive. Such collaboration is seen in Europe through Horizon 2020[23] and other collaborative research schemes (eg Erasmus Plus[24]), and also in some Go8 institutions in small, niche programs (eg GC-ALL, iPrep WA).

Opportunities for student mobility and international experience could be created, for example, by increasing the number of jointly awarded degrees offered in partnership with key international institutions.

## Research training system

**7. What features of the research training system should be retained to ensure our graduates are internationally competitive?**

The core elements of the system that must be retained are:

- Recognition of capability and prior experience for selection into HDR
- Completion of a significant research project that, in the case of doctoral education, makes an original contribution to knowledge
- Supervision by an expert advisory panel
- External examination.

The most successful programs are those that select highly motivated individuals who exhibit high capability to undertake HDR studies. Selection may be based on academic performance and/or a track record of research achievements gained through professional experience. UoM strongly supports the retention of capability and equivalence measures as selection criteria for admission, in particular to increase indigenous participation in HDR.

The amount of time available for original research must be preserved as this is the foundation of the PhD and what makes the Australian PhD well-regarded internationally. The *value* of research training, particularly the PhD, must also take into account its contribution to Australia's research output.

PhD candidates contribute significantly to the total research effort and hence international standing of Australian universities. HDR candidates at UoM outnumber academic research or teaching and research positions by a ratio of approximately 3:2. The nature of the research conducted by graduate researchers may also be different. In the Melbourne School of Engineering, PhD candidates can tackle high-risk: high-return projects that are not fundable by the more conservative competitive funding schemes (eg ARC). This research effort enhances the Australian economy in many ways. Reducing the research component of the PhD or decreasing the number of PhD students

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[23] http://ec.europa.eu/programmes/horizon2020/

[24] http://ec.europa.eu/programmes/erasmus-plus/index_en.htm

would significantly impact the capacity for universities to maintain their international standing in research.

The expansion of supervision from sole supervisor to an advisory panel has had a positive impact on student satisfaction and management of student progress and provides a framework for industry and interdisciplinary involvement in the research project.

8. **How should the research training system be structured to produce high quality researchers who can contribute to Australia's future prosperity and wellbeing?**

9. **How can entry and exit pathways to and from research training be better structured?**
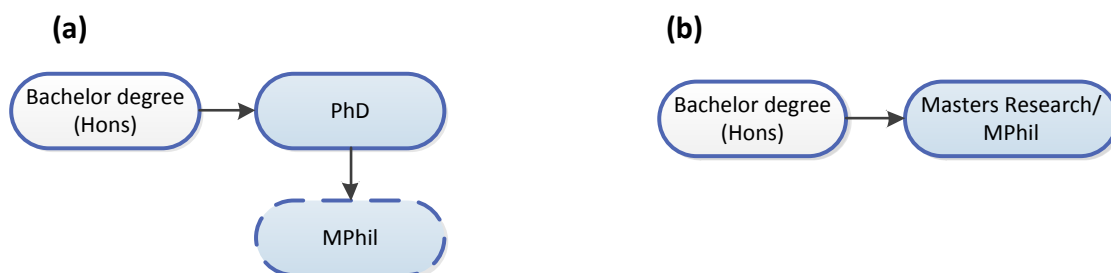
Distinct discipline differences influence the structure and pathways for research training. For those where doctoral training is provided explicitly to fulfil the needs of the academy (eg Melbourne Law School), no change in model is required. A similar situation exists in Education where many candidates are professional educators looking to extend their capabilities.

Similarly, research training in the creative arts does not require further articulation - creative arts graduates don't join the industry, they are the industry.

A variety of models are used to varying degrees at UoM. Dashed lines indicate potential alternative exits and blue highlights indicate Research Training Scheme (RTS) funded components.

The flexibility to provide a combination of these models is required to respond to student and employer needs and to align training with international best practice in the respective disciplines.

**Model 1**

**(a)**

Bachelor degree (Hons) → PhD → MPhil

**(b)**

Bachelor degree (Hons) → Masters Research/ MPhil

Model 1 is the traditional research training model in Australia. Inclusion of more discipline and transferrable skills training in the PhD (model 1a) is constrained by the length of Australian Postgraduate Award (APA, 3.5 years). Awarding the APA to 4 years to align with the RTS, would remove this constraint.

To be internationally competitive, the Faculty of Business and Economics has introduced a 4 year doctoral program comprising two years advanced coursework and 2 years research, with blended funding. This structure is required to be competitive with US finance and business schools and achieve AACSB certification.[25]
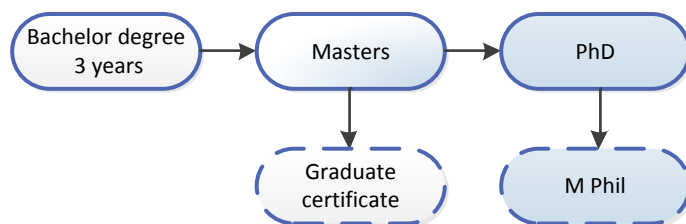
A number of academics in engineering (pers comm) also believe that additional discipline training is required in HDR to remain competitive with US counterparts in terms of graduate capabilities.

The Australian Qualifications Framework[26] distinguishes the PhD as *"research in the program of learning will be for at least two years and typically two-thirds or more of the qualification".* If the PhD is to be extended with additional coursework and transferable skills training, the proportion of the research may not be two-thirds of the program.

The suite of activities that might be included in a formalised 4 year PhD will depend on discipline needs.

In model 1(b) the Research Masters is the primary exit point with few students progressing to a PhD. UoM supports the provision of RTS-funded research masters, particularly for the creative arts disciplines. The completions by field of education data presented by ACOLA[27] (Appendix 1) show that 42% of completions in Creative Arts are by research masters graduates. For all other disciplines masters' completions represent only 10-20% of HDR completions. The research masters is an important qualification in Creative Arts in Australia.

**Model 2**



Model 2 aligns more closely with leading institutions in the US and Europe, effectively creating a nested PhD program of 5–6 years duration. It would not require an Honours degree (which is globally rare). This model would be competitive for international students looking for a *complete* graduate program containing cutting edge discipline coursework, professional skills and high quality research.

The Masters would include deep discipline and professional skills training, and a significant research project to assess the student's ability to conduct research. Students with professional masters'

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[25] http://www.aacsb.edu/

[26] http://www.aqf.edu.au/wp-content/uploads/2013/05/AQF-2nd-Edition-January-2013.pdf

[27] ACOLA, 2015 Securing Australia's Future Project 13: Review of Australia's Research Training System – Discussion Paper

qualifications could obtain advanced entry. The PhD would then be focussed entirely on research. This model provides the greatest opportunity for alternative exits: a nested graduate certificate, masters or MPhil qualification.

The Masters described above may be sufficient research training to meet the research capability needs of small to medium enterprises that are less likely to require doctoral graduates.

Flexibility in the duration, rate of support and eligibility (ie not require an honours qualification) for scholarships is required to support students throughout the full research pathway.

The AQF distinguishes a Masters Degree (Research) as one "*designed so that graduates will have undertaken supervised study and research of which two-thirds will be devoted to research, research training and independent study.*"

Permitting the masters research qualification to contain up to 50% taught subjects would better support this model.

*Cohort building*

Numerous surveys and reports have emphasised the benefits of a cohort experience and the peer support that cohorts bring, and in working in a research group or teams. In those disciplines where teams are rarer, completions rates are reduced. Programs such as the GC-ALL were designed to assist cohort development and improve completion rates. A similar driver saw the introduction of coursework into the Year 1 of the PhD in Arts at Melbourne.

*Embedded PhD*

A number of UoM HDR students are embedded in 'industry' in affiliated medical research institutes and hospitals, Cooperative Research Centres, Bio21, Victorian government agencies and state and national research agencies.

Embedding candidates within new and innovating enterprises should provide a win–win - facilitating access of these developing industries to high quality research, while providing industry relevant skills to HDR candidates.

Additional supervision support will be needed to ensure that candidates are not diverted from their research project into routine business activities, and that they engage with cohort activities and university-delivered discipline and skills training.

*Internships*

UoM supports an industry experience for its HDR cohort and has co-invested with five Victorian and two NSW universities to expand the opportunities available through AMSI Intern.[28] Further expansion of internships models will require some alignment of government policy and regulation as noted in the *National Strategy on Work Integrated Learning*.[29]

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[28] http://amsiintern.org.au/2015/08/02/co-investment-internships/

[29] http://cdn1.acen.edu.au/wp-content/uploads/2015/03/National-WIL-Strategy-in-university-education-032015.pdf

HDR supervisors are more supportive of internships undertaken after thesis submission. Maintaining student enrolment and income support post-submission will be necessary for internships to be a normal component of HDR training.

*HDR funding*

As discussed throughout, flexibility in being able to fund scholarships for the duration of the research pathway is needed.

The *Australian Innovation System Report* 2014[30] notes that: "migration and retention of international students in Australia will be important to meet the demand for research-qualified staff in the medium term. Even so, demand by business, academia and government for people with HDR qualifications are projected to outstrip supply by 2020" (p 167).

It is worth noting that Australian universities are investing heavily in international student recruitment to support Australia's research capacity. UoM provides 320 full stipends at the APA rate and a number of partial stipends to attract international students. Almost all international students are also provided with a full fee-remission scholarship.

**Question 10 - How can barriers to participation in HDR programs be overcome so that more candidates from non-traditional backgrounds, including indigenous students, undertake research training?**

*Participation by women*

Women make up 53% of current enrolments in UoM HDR courses, and a case study of the 2007 commencing PhD cohort revealed that completion rates for women slightly exceed those for male students after 8 calendar years. In the UoM experience at least, the gender inequity in participation in research noted by ACOLA occurs after HDR completion. The distribution of HDR candidates by gender across disciplines is not equal however (eg reduced in Business/Economics and Engineering at Melbourne) leading to downstream shortages of PhD-trained graduates entering these sectors, within or outside the academy.  Redressing these imbalances is a priority for the deans of these faculties.

With the average age of commencement of an HDR being 31 years, appropriate support for students beginning their families is important to maintain female participation. The University of Melbourne offers generous primary carer/maternity leave for HDR of 12 months leave per child.[31] One maternity leave payment of 12 weeks is available to APA recipients. The University now provides 12 weeks' payment for subsequent maternity leave within candidature.

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[30] http://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Documents/Australian-Innovation-System/Australian-Innovation-System-Report-2014.pdf

[31] University of Melbourne Graduate Research Candidature Procedure, https://policy.unimelb.edu.au/MPF1281

*Participation by equity groups*

In addition to parental leave, the University allows up to 24 months leave of absence (cumulative) for ill health, family or carer responsibilities or for other substantiated reasons which prevent the student carrying out their research.[32] These provisions, along with equity scholarships for students who have experienced disadvantage[33] are designed to increase inclusion.

If *timely* completion is introduced as a measure of institutional performance, it must be reported on the basis of consumed load rather than on calendar years from commencement to avoid discrimination of women and candidates who cannot participate full time. Reporting of timely completions will require system development across the sector.

*Participation by part-time students*

Part-time students have a higher risk of non-completion as employment and family pressures divert their energy. Incentives to take leave from work to concentrate full time on their PhD, for example by providing writing-up scholarship, or employer incentives to release/train staff would increase participation by mature age students.

*Participation by indigenous Australians*

UoM believes that achieving a critical mass of indigenous HDR-qualified academics and researchers is crucial to provide the culturally competent role models and mentors that will inspire further indigenous participation in education and research. A recent focus group meeting of the University's indigenous HDR cohort reinforced this view.

The University aims to achieve population parity for indigenous students by 2050 and to pursue an indigenous research agenda to identify and promote pathways into Indigenous research and increase its range and impact.[34]

The University is investing in critical interventions to achieve these aims. It has introduced research preparedness programs for indigenous students and those undertaking indigenous research;[35] a PhD Familiarisation Program for indigenous students,[36] provides targeted individual financial, residential and academic support to the HDR cohort through its PhD+ program; introduced a Graduate Certificate in Indigenous Research and Leadership[37] to support completion and develop early career leadership; and has adopted a policy that all eligible indigenous HDR applicants will be offered a scholarship equivalent to the APA rate. The Melbourne POCHE Centre for Indigenous Health[38] aims to recruit 20 indigenous HDR students by 2020. Planning is also underway for a cross-disciplinary Indigenous PhD Program.

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[32] ibid

[33] http://services.unimelb.edu.au/scholarships

[34] The University of Melbourne Reconciliation Action Plan 2015-2107
http://about.unimelb.edu.au/__data/assets/pdf_file/0011/1379369/10983-MurrupBarak-RAP_LAND-V4b-FINAL.pdf

[35] http://www.cshe.unimelb.edu.au/prof_dev/indigenous/

[36] http://indigenousresearch.unimelb.edu.au/content/indigenous-phd-familiarisation-program-2015

[37] http://www.cshe.unimelb.edu.au/prof_dev/indigenous/

[38] http://poche.mdhs.unimelb.edu.au/

The following policy settings would enhance higher education providers' (HEP) indigenous HDR recruitment and retention activities:

- Provide an additional travel allowance within the APA to support indigenous and remote students to return to their communities at least twice during their candidature
- Pay a loading for indigenous HDR completions to assist HEP in funding indigenous support programs. This model has been used successfully in New Zealand where Māori completions are funded at twice the usual rate.

# Further information

The University of Melbourne data presented below is unaudited, internal data.

**Table 1.** Employment intentions: responses from UoM 2015 Commencing Candidate Survey

| What employment do you intend to seek on completion? | No. responses | % responses |
|---|---|---|
| Research role at a university* | 164 | 36% |
| Research role in a government organisation | 31 | 7% |
| Research role in a professional or commercial organisation | 41 | 9% |
| Teaching role at a university | 55 | 12% |
| Professional role at a university | 26 | 6% |
| Professional role in a government organisation | 17 | 4% |
| Professional role in a professional or commercial organisation | 38 | 8% |
| Self-employed | 22 | 5% |
| Other (please specify)[#] | 9 | 2% |
| Not sure | 50 | 11% |
| I do not intend to seek employment | 5 | 1% |
| **Total** | **458** | **100%** |

*includes research and teaching roles; [#]includes blended professional and research roles. Survey achieved 40% response rate

**Figure 1.** Distribution of UoM admitted students by 2-digit FoR code (*n*=4674, at 20 July 2015).