Research Skills for an Innovative Future: Business Views and Needs

Final Report

Funding for this project was provided by the Department of Industry, Innovation, Science, Research and Tertiary Education

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Executive Director
October 2012
Executive Summary

This report summarises the proceedings of two workshops commissioned by the Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE) designed to bring together business and university representatives to discuss the value of Higher Degree by Research (HDR) graduates as employees within their organisations. Business employers offer an important perspective to the implementation of the Australian Government’s Research Workforce Strategy.

The workshops were hosted by Griffith University and the Queensland University of Technology and the participants invited were employers of research graduates. To enable broad ranging discussions, a cross-section of employers (ranging in size and by sector) were selected.

Key findings

- Business representatives displayed a limited understanding and appreciation of the HDR training experience and skill sets and HDR graduates’ contribution to business productivity and an innovative economy.

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

Priorities

1. Develop a national communication strategy to lift understanding and awareness among the business community about expertise of HDR graduates and value to organisations of that expertise.

2. Strengthen the understanding of and communicate the connection between innovation and research and the contribution they make to economic and social benefits at local, national and international levels.

3. Introduce arrangements between universities and industry to facilitate work placement opportunities and exchanges for HDR students with the aim of narrowing the gap between the academic and business environments.
Background and Purpose

In the launch of Research Skills for an Innovative Future, a research workforce strategy to cover the decade to 2020 and beyond (RWS) the Australian Government reaffirmed the importance of innovation and education as vital components in achieving a secure, prosperous and productive nation as part of a global knowledge economy. The research workforce and the application of their professional skills in the wider community underpin the achievement of these objectives. The RWS represents the culmination of ongoing work beginning in 2008 to address Australia's workforce needs to 2020 and beyond.

The strategy, vision, aspirations and priority areas of the RWS reflect the important and multifaceted role the Government makes in meeting Australia's workforce needs. It has been established that under an innovation economy Australia faces a shortfall of research skills in future years\(^1\). It is less clear the extent to which these shortfalls will impact on individual disciplines and sectors.\(^2\) Establishing new processes to improve national skills planning capacity is identified as a priority of the RWS with an emphasis on broad consultation that includes employer groups in order to map priority research skills within individual disciplines and industry sectors.

The RWS also calls for strengthening the quality of supply through Australia's research training system by developing of new models for research training focused on the professional employment needs of HDR graduates, among other things.

Business perspectives regarding the usefulness of research skills provide informative insights on the implementation of the RWS particularly in the priority area of the quality of supply. DIISRTE commissioned the Business/Higher Education Roundtable (B-HERT) to conduct two workshops seeking business views about research workforce skills and the value of HDR graduates as employees within their organisations. The information gathered from the workshops will inform the continued implementation of the strategy.

Workshop design

This report summarises the proceedings of the two workshops undertaken by the Business/Higher B-HERT as part of the project funded by DIISRTE. Attachment 1 is an outline of the workshop brief.

The invitation list of employers of HDR graduates was developed following close consultation with Griffith University (GU) and the Queensland University of Technology (QUT), DIISRTE and the B-HERT database. The employers were selected based on their size (a cross-section of small to medium enterprises (SMEs) to larger international companies) and business sector. In addition to the employers, a small number of senior university personnel involved in HDR programs and DIISRTE representatives also joined the workshop. Dr Sharon Winocur, Executive Director of B-HERT facilitated the discussions.

The total number for the workshop was limited to 25 participants to allow for a comprehensive discussion of the issues. Attachment 2 provides a breakdown of the participating organisations. The workshop discussions should not be considered representative of all industries, employers or researchers as the workshop discussions canvassed views from a limited cross-section of employers.

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\(^1\) Access Economics [2010], Australia’s future research workforce - Supply, demand and influence factors, report prepared for the Department of Innovation, Industry, Science and Research.

Employers participating in both workshops were senior representatives from the public service, public sector research entities, consulting companies and companies that rely upon research developments in their field. The HDR graduates could be employed in either a research or non-research related role. Employers’ views about the skills and attributes of the HDR graduate workforce and employers’ future needs were explored.

There were some distinct differences between the GU and QUT participants. The majority of participants in the GU workshop employed HDR graduates in non-research related roles while the employers in the QUT workshop were more actively involved in research. The two groups were complementary and representative of the broad range of employment opportunities for HDR graduates in both research and non-research capacities. Attachment 3 outlines each of the workshop agendas.

Prior to the workshop, participants were asked to complete a survey. The surveys and findings are at Attachments 4 & 5 respectively. The survey instruments were designed to identify issues and stimulate discussion. It must be emphasised that caution should be exercised in applying the survey results widely because of the small sample size and limited data analysis. The results, however, support similar findings reported elsewhere.3

**Discussion of Key Findings**

**The Innovation - Research Nexus**

- *Business representatives displayed a limited understanding and appreciation of the HDR training experience and skill sets and HDR graduates’ contribution to business productivity and an innovative economy*

The principles underlying the government’s policy framework acknowledge that economic growth and the nation’s future prosperity are dependent upon a stronger culture of innovation.4 To meet these challenges requires strengthening business research and development (R&D) investment which in turn will require more people with research and technical skills. This direct link between innovation and R&D is internationally recognised among OECD countries (and increasingly among developing countries) which are investing heavily in education and research.

This challenge may be more difficult in Australia than in other countries given that the value of HDR graduates is not understood and utilised in the same way in the Australian business environment as in other OECD countries. For example, in Australia the majority of the research workforce is employed by higher education and research institutions. In the largest research workforces in Korea, Canada, Chinese Taipei as well as Sweden and the Netherlands it is the business sector where the research workforce dominates and business has led the growth in the number of the researchers. Coincidentally or otherwise, these countries are also leaders or emerging leaders in R&D outputs.5 This greater participation of HDR graduates in business could mean that there is a greater understanding of the value of hiring HDR graduates in some OECD countries than there is here in Australia.

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5 Australian Government [2011], *Focusing Australia’s Publicly Funded Research Review; Maximising the Innovation Dividend; Review Key Findings and Future Directions*, Canberra, p.45.
It was interesting to note that workshop representatives from businesses that actively seek researchers referred to budget constraints as an impediment to the hiring of domestic researchers. This was cited as the major reason for hiring qualified people offshore. For example, companies in the mining sector recruit from overseas as skills shortages have driven up the cost of hiring domestic researchers.

While most employer representatives at the workshops understood the need to innovate, there was limited understanding of the practical contribution of HDR graduates to the firms’ innovation capacity. Participants expressed the view that they did not specifically recruit HDR graduates as part of their hiring policy despite the number of HDR graduates among their staff. Employers who were not involved in traditional research activities but nevertheless utilised the expertise of HDR graduates, did not always connect the value of the HDR graduates’ research training and expertise to the company’s skills needs and requirements. This attitude was reinforced by many of the workshop participants.

In contrast, a workshop participant from the water industry in Queensland related how this industry has successfully exploited the connection between R&D, innovation and productivity. Out of necessity there is now strong endorsement and pressure within the industry to innovate and R&D and research skilled personnel are accepted as the key contributors to this strategy. Innovation is being escalated throughout the water sector as the means to solve emerging problems.

Workshop discussions demonstrated that business views are in sharp contrast to those of the universities. Participants noted that universities generally consider the relationship between research and innovation as natural and interdependent. From their perspective, universities have two major stakeholders: the public and the business community. The workshops made it apparent that the inherent connection between R&D and innovation could be better communicated to industry; the challenge for academia is to demystify its research activities and better align them to a commercial environment.

Small to medium enterprises, of which Australia has a high proportion, are less likely to innovate or be involved in R&D activities compared to large businesses.6 One means of boosting the innovation capacity of SMEs is through improved collaboration with public research institutions.7 Workshop discussions suggested that SMEs in general do not recognise or utilise the full value of HDR graduates. This is due in part to budget and time constraints and a lack of awareness as to how to access research skills. A change in this perception was considered important if Australia is to be successful in competing with global knowledge economies. It was also noted that in Australia there is almost no understanding of the value of HDR graduates in some of the country’s biggest industry sectors such as mining, agriculture and tourism. This is a factor that could contribute to a possible disconnect between innovation, research and productivity.

6 Australian Bureau of Statistics, Innovation in Australian Businesses, 2008-09. Catalogue No 8158.0

R&D contribution to state, national and global economic and social prosperity: A University of Queensland (UQ) case study

The establishment of four research intensive institutes: Institute of Molecular Bioscience (IMB); Australian Institute for Bioengineering and Nanotechnology (AIBN); Queensland Brain Institute (QBI); and Sustainable Minerals Institute (SMI), has created well-developed internationally recognised research strengths and facilities which, in turn, have provided the core support needed to leverage financial support from other sources. In addition to advancing UQ’s reputation, the work has fostered productive relationships between the institutes and specific companies which have lifted these companies to be globally competitive. These institutes have attracted investment to the benefit of both the Queensland and Australian communities. They have created a dynamic research atmosphere drawing in research students and post-doctoral researchers bringing with them skills and often funding to the state. Further, the research concentration has made Brisbane a desired location for biotechnology, nanotechnology and mining services companies. In addition, over 200 postgraduate research students have been trained and 19 spin off companies have been established.

Business Views on the Alignment of HDR graduate Skills and their Requirements

- Employers value teamwork and strong analytical and critical thinking skills in current HDR graduates. Skill sets in data analysis, predictive modelling and decision-making 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 was consensus among business representatives that HDR graduates were equipped with valuable analytical and critical thinking skills and the capacity to work well within a team environment. Employers also value the capacity to contemplate long term horizons (5-15 years out) and subject matter expertise that can be synthesised into a service environment.

Those companies and employers involved in research particularly valued communication skills. The ability to communicate and engage with external stakeholders, specifically the ability to translate the research into an applied context, is seen as a very important enabler in a commercial environment. Workshop participants emphasised the value of effective communication with stakeholders throughout the entire research cycle, i.e. from actual research to application.

There was a discussion regarding a perceived trend of research degrees in some disciplines moving away from the traditional idea of proposing and examining questions to a more project based approach where the questions are already defined. Workshop participants expressed concern that

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increasingly HDR students are encouraged to focus on and resolve a problem as quickly as possible because of the requirement to complete the degree within a prescribed timeframe. Some participants indicated that HDR graduates are therefore entering the workforce with fewer opportunities to develop critical thinking skills and the ability to generate new ideas or question existing practice.

There was a perception from employers in the workshop that pure research-based HDR graduates are becoming rarer because of the shift from pure research to applied research. Workshop participants made the point that conducting research is different now than in the past. There is now increased access to information and a large amount of data is collected, shifting the focus towards analytics and modelling of large data sets within qualitative and quantitative paradigms. This change of skill set for HDR graduates could be seen as more or less useful to employers depending on the business they are in.

Workshop participants frequently referred to work that increasingly crosses different disciplines and sectors and requires employees with interdisciplinary skill sets. There is a growing emphasis for HDR graduates to have the capacity to be flexible and to adapt to working in a multi-disciplinary team environment. Working comfortably across disciplines and with people from different disciplines is becoming a defining characteristic of the workplace environments for HDR graduates.

There was strong concurrence among all workshop participants on the value of preparatory training for HDR students to enable them to work more effectively in a commercial context. Employers are aware that when HDR graduates join the company, changing focus from project management to commercial endpoints in a commercial research environment can be challenging. While employers value the desire of many researchers to ‘make a difference’, they also emphasised that this ultimately needs to be translated to product development.

The question often asked by employers is ‘what is the employee going to offer the client that is profitable to the company?’ The commercial imperative of private sector employers means that HDR graduates must be able to offer a service orientation to the clients. Therefore, understanding the value proposition of the commercial application of research is essential for HDR graduates. The broader the skill set of the HDR graduate and more flexible they are, the more useful employee they are and the better the outcome for the company.

Some universities have been reviewing the course design of HDR programs with the needs of industry in mind. For example, some institutions are moving towards incorporating more coursework in PhD programs as well as providing industry placements to students during the program so that they can be more ‘work-ready’ upon completion. Programs for HDR students designed to support the transition to operating in a commercial environment are becoming more available.

**Building Links between Universities and Business**

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

Employers recognise the differences in culture between the academic and commercial worlds and people who can span the two cultures are highly sought after. It was felt that better collaboration between universities and business and better linkages between research partners would assist in providing HDR graduates with valuable opportunities to work effectively across these differing cultures. Improved collaboration would also assist employers in better understanding what universities could do for companies in the research space.

Both university and business participants agreed that there are significant benefits to be gained from more secondments, work based experience and internships, particularly at the postgraduate level. If research needs to find relevance in the ‘real world’ then, as noted above, the students would benefit from more work-based experience with placements aligned to their field of endeavour. In addition,
more work based experience would assist in improving understanding and communication between these two sectors. There was consensus that increasing opportunities for exchange and secondments between researchers, academia, industry and government should be pursued.

Higher education institutions received initial Australian Government funding to operate a commercialisation training scheme for their cohort of PhD students. Though the funding is no longer available, QUT continues to offer a graduate certificate in commercialisation training because of its high value to HDR students. The Australian Technology Network (ATN) university group is offering an e-grad scheme, where doctoral students are able to undertake online courses with modules as part of a generic skills training suite.

Better linkages between research employers are also seen as important to increase opportunities and outcomes for HDR students and their eventual employers. For example, there is limited engagement between institutions such as museums, universities and companies. Organisations like museums are not seen as practitioners of research however some do undertake research themselves and would like to be more involved with university research.

Participants noted that the logistical and administrative burdens involved in engaging an HDR student through a collaborative arrangement between a university and business may be a barrier and should be simplified to facilitate a greater uptake of these engagements.

Data indicates approximately 50 per cent of HDR graduates pursue non-academic related careers. For example, while most HDR graduates indicate an initial preference to pursue an academic career, many reconsider this option one year later. Workshop participants felt that this may be a consequence of the lack of certainty in research funding that extends, in the main, only 2-3 years.

Business participants generally were of the view that they did not purposefully recruit staff with postgraduate qualifications. Employers also commented that HDR students are often unaware of career tracks outside academia, which means that industry needs to market opportunities and pathways to HDR students. These other pathways also need to be better understood and promoted through HDR training programs. This is particularly the case for female HDR graduates who are more likely to move in and out of career paths due to family and caring commitments.

Obtaining research funding is a highly competitive process and HDR graduates are well versed in developing traditional applications for research grants. As more public sector funding for projects becomes available through open tender methods, it is important that HDR graduates become familiar with accessing these broader funding opportunities. For example, government agencies expect grant funding submissions to be related to government priorities. Two common assessment criteria used by government agencies are incorporating the economic benefits and the likely impact of research outcomes. The skills required in developing successful submissions that can attract public sector funding are increasingly important for HDR graduates in a very contestable research environment. This is another example of the importance of translational skills so that HDR graduates can effectively communicate the value of their work within a broader context.

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9 GCA (2010), Postgraduate Destination Survey 2010, Melbourne: Graduate Careers Australia.
Conclusion

Business perspectives on research skills provided informative insights on the implementation of the Government’s workforce strategy. The workshop outcomes indicated that further work could be done to complement the strategy in increasing the understanding of the business community to the value of HDR graduates and their skills to businesses. Indications from the workshops were also that it would be of useful to try and better communicate connection between innovation and research and its contribution to economic and social benefits locally, nationally and internationally. The following general priorities were identified.

| Priority 1 | Develop a national communication strategy to lift understanding and awareness among the business community about HDR graduate expertise and the value to organisations of that expertise |
| Priority 2 | Strengthen the understanding of and communicate the connection between innovation and research and the contribution they make to economic and social benefits at local, national and international levels |
| Priority 3 | Introduce arrangements between universities and industry to facilitate work placement opportunities and exchanges for HDR candidates. This would also contribute to narrowing the gap between the academic and business environments. |
Research Skills for an Innovative Future: Business Views and Needs

Queensland College of Art, Griffith University
Friday, 21 October, 2011

Queensland University of Technology
Friday, 2 March 2012

Purpose:
To conduct a series of workshops to ascertain business views about research workforce skills, employers’ current and future needs and projected employment opportunities for higher degree research graduates.

Background:
The Department of Innovation, Industry, Science and Research (DIISR) launched the report, Research Skills for an Innovative Future, in order to address Australia’s workforce needs to cover the decade to 2020 and beyond. The report recommends that business investment in research and development must intensify in order to compete effectively on an international scale. DIISR has commissioned the Business/Higher Education Roundtable (B-HERT) to conduct two workshops seeking business views about research workforce skills. The information gathered from the workshops will inform the development of the government’s implementation strategy.

Following B-HERT’s approach, both Queensland University of Technology and Griffith University have agreed to participate and host a workshop. The workshops will be managed by B-HERT but to maximise the information obtained, both universities agreed to collaborate on the selection of complementary disciplines and suggest appropriate participants who can contribute to the consultation process. B-HERT will issue the invitations and although some university personnel will be represented, the workshops will focus on the views of business/industry that employ higher degree research graduates (HDR) in both research and non-research roles.

The Workshops:
No more than 25 participants will be involved in each of the workshops with the majority coming from business and industry. Senior university research staff from each of the two universities will also attend. B-HERT will chair and facilitate the workshops.

Prior to the workshops, DIISR has requested that the participants complete a survey and the findings will be used in the workshop about the research workforce. The types of issues that will be covered include:

- the value attributed to HDR graduates as employees;
- the projected employment need for HDR graduates over the next decade and in what capacity;
- the perceived international competitiveness of Australian HDR graduates;
- industry recruitment practices to obtain HDR graduates;
- extent of collaboration with HDR graduate providers;
- recommendations to government for next steps.

Each workshop will be introduced by a panel consisting of 3-5 industry representatives and 1-2 university research personnel, each of whom will present short individual perspectives on the research workforce. The subsequent workshop discussion on the topic will draw out the full range of business/industry views.
WORKSHOP PARTICIPANTS

1. Australian Genome Research Facility
2. Australian Institute of Commercialisation
3. Boeing Research and Technology Australia
4. Business/Higher Education Round Table
5. BSES Limited
6. Cancer Council of Queensland
7. CSIRO
8. Department of Communities, Queensland Government
10. Department of Industry, Innovation, Science, Research and Tertiary Education
11. Department of Local Government & Planning, Queensland Government
12. Economic Futures Australia
13. Emergency Management of Queensland, Department of Community Safety, Queensland Government
14. Glenala State High School
15. Griffith University
16. Queensland Health
17. Queensland Institute of Medical Research
18. Queensland Museum
19. Queensland Police Service
20. Queensland University of Technology
21. SEQ Water
22. Sinclair Knight Merz
23. Success Factors
24. Unquest
25. University of Queensland
26. VenturePro
27. Wound CRC
ATTACHMENT 3

RESEARCH WORKFORCE WORKSHOP
Queensland College of Art, Griffith University
Webb Ctr, Level 7 Boardroom
Friday, October 21, 10-30am - 2.30pm

AGENDA

10.30 - 10.45: Welcome and introductions (Dr Sharon Winocur, B-HERT)

10.45 - 11.00: Workshop Objectives (Dr Caroline Perkins, DIISR)
Policy context and Government research workforce strategy

11.00 - 11.10: Survey results (Dr Alison Manion, DIISR)

11.10 - 11.30: Panel Comments (Jennifer Howe, Garry Richardson, Prof Parlo Singh, Dr Patrick Silvey)

11.30 - 11.50: The value attributed to higher degree research (HDR) graduates as employees

11.50 – 12.10: The projected employment need for HDR graduates over the next decade and in what capacity

12.10 - 12.30: The perceived international competitiveness of Australian HDR graduates

12.30 - 1.00: Lunch

1.00 - 1.20: Industry recruitment practices to obtain HDR graduates

1.20 - 1.40: Extent of collaboration with HDR graduate providers

1.40 - 2.00: Other issues

2.00 - 2.20: Recommendations to government for next steps

2.20 - 2.30: Close (Dr Caroline Perkins; Dr Sharon Winocur)
RESEARCH WORKFORCE WORKSHOP
Kelvin Grove Campus, QUT
Room 109, Level 1, 88 Musk Avenue, Kelvin Grove
Friday, 2 March 10.30am - 12.30pm

AGENDA

10.30 -10.45: Welcome and introductions (Dr Sharon Winocur, B-HERT)

10.45 -11.00: Workshop Objectives (Dr Alison Manion, DIISRTE)
Policy context and Government research workforce strategy

11.00 -11.10: Survey Findings/Overview of Workshop 1 (Dr Sharon Winocur)

11.10 – 12.10: Discussion of research workforce issues including:
- The value attributed to higher degree research (HDR) graduates as employees
- The projected employment need for HDR graduates over the next decade and in what capacity
- The perceived international competitiveness of Australian HDR graduates
- Industry recruitment practices to obtain HDR graduates
- Extent of collaboration with HDR graduate providers

12.10 -12.25: Recommendations to government for next steps

12.25 -12.30: Close (Dr Alison Manion, Dr Sharon Winocur)

12.30: Light lunch
About this survey
The purpose of the survey is to provide data on how business views the role and value of research trained individuals in their organisation. It aims to provide information on the extent to which industry needs for researchers are being met, and whether there are any significant barriers or impediments to accessing both the quantity and quality of research skilled employees required by companies.

We are requesting employers of HDR graduates in either a research or non-research capacity to complete the survey.

The results from this survey will feed in to the roundtable discussions around industry need for researchers to be held in October 2011.

How is this linked to research trained personnel?
The capacity to innovate and to increase competition and productivity depends on a country’s skilled research workforce. In the 2009 Powering Ideas document, the government set a target to significantly increase the number of students completing higher degrees by research (HDR) over the next decade. Apart from increasing the number of HDR students, there is also a need to understand the industry demand of research qualified staff.

Who is conducting this survey?
This survey has been developed by the Department of Innovation, Industry, Science and Research (DIISR) in collaboration with the Business Higher Education Roundtable (B-HERT) to inform the implementation of key priorities under the Research Workforce Strategy.

Confidentiality
Information supplied through this survey will not be disclosed, published or disseminated in a manner that may reveal the identity of the respondent; however answers aggregated with those of other respondents will be published or used in analysis of research workforce issues.

Completing the Questionnaire
Please limit responses to the Australian operations of your company and/or subsidiaries.

Submission: Please submit your response to swinocur@bhert.com by Friday 7th October 2011.

Contact: If you have any enquiries about this survey, please contact Alison.Manion@innovation.gov.au or swinocur@bhert.com.

Contact person (for verification purposes only)
Name: ________________________________
Company Name: ________________________________
Position or Title: ________________________________
Telephone Number: ________________________________
Email Address: ________________________________
ORGANISATIONAL SIZE

Definitions
Full-time equivalent (FTE) – Full-time equivalent staff.

1. What is the size of your organisation (at the State/subsidiary/local office level)? (Estimated FTE)

Size of the organisation  
Tick one box

Less than 20 employees  
☐

20 to 199 employees  
☐

200 or more  
☐

ORGANISATIONAL MAIN ACTIVITY

2. Identify the main industry sector of your organisation (this is the sector that constitutes the largest amount of activity/revenue).

Tick one box

Agriculture, forestry and fishing  
☐

Mining  
☐

Manufacturing  
☐

Electricity, gas, water and waste services  
☐

Construction  
☐

Wholesale trade  
☐

Retail trade  
☐

Accommodation and food services  
☐

Transport, postal and warehousing  
☐

Information media and telecommunications  
☐

Financial and insurance services  
☐

Rental, hiring and real estate services  
☐

Professional, scientific and technical services  
☐

Administrative and support services  
☐

Public administration and safety  
☐
Education and training
Health care and social assistance
Arts and recreation services
Other services
Other Industry (Please specify) ________________________________

Note: The complete classification, including detailed descriptions is available in 1292.0 - Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006 (Revision 1.0)

3. Does your organisation conduct in-house research?

Definition

Research – is defined as the creation of knowledge and/or the use of existing knowledge in a new and creative way so as to generate new concepts, methodologies and understandings. This could include synthesis and analysis of previous research to the extent that it leads to new and creative outcomes.

☐ Yes.
☐ No. We do not conduct in-house research but we do commission it.
☐ No. We do not conduct or use research.

4. How many of your staff involved in research and/or non-research roles have HDRs? (if known or best estimate)

Definitions

Higher degree by research (HDR) – Doctorate (PhD) or Masters by Research from an Australian or international higher education institution.
Researchers – those involved with the conception/or development of new products/processes.
Technicians – those performing technical tasks in support of R&D activity, normally under the direction and supervision of a researcher. These tasks include preparation of experiments, taking records, preparation of charts and graphs, etc.
Other staff – skilled and unskilled craftpersons, secretarial and clerical staff.

<table>
<thead>
<tr>
<th>Staff roles</th>
<th>Estimated FTE</th>
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<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Research (i.e. Researchers, Technicians)</td>
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<tr>
<td>Non-Research (i.e. other staff)</td>
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</table>
5. Does the above distribution of HDR-qualified staff reflect your organisation’s /office’s research needs?

☐ Yes
☐ Somewhat
☐ No
☐ Unsure

6. What are the job functions of HDR-qualified staff?

Tick one or more boxes

Scientific research and development
Research roles
Management roles
Engineering (including consultancy)
IT (including consultancy)
Other (Please specify) ______________________________________
_____________________________________________________
________________________________________________________
RECRUITMENT AND RETENTION OF HDR TRAINED STAFF

7. Does your organisation:

☐ Actively seek HDR graduates for research roles
☐ Actively seek HDR graduates for non-research roles
☐ Both of the above
☐ Employ qualified candidates with research skills regardless of whether they have a HDR (Proceed to Q19)

8. How does your organisation recruit HDR-qualified staff?

Tick one or more boxes

Internet advertising ☐
Liaise with educational institutions through career counsellors ☐
Newspaper advertisement ☐
Personal or work contact/network ☐
Presentations at universities ☐
Private employment agency ☐
Professional association contact ☐
Public service contact ☐
Research journal advertisement ☐
Other (Please specify) ☐

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9. Which factors, do you believe, contribute to your organisation’s ability to attract and retain HDR-qualified staff?

Mark 1 -5 in order of importance
(1 being the most important)

Attractive remuneration package ☐
Scholarships/work experience ☐
Flexible working conditions
Employer funded study
Mentoring
Management support
Access to advanced technology
Organisational prestige
Opportunity to attend conferences
Collaboration opportunities
Career development program
Career progression
Tenure/contract security
Time to prepare publications
Other (Please specify)

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

10. What factors, if any, impede your organisation’s ability to engage domestic HDR-qualified staff?

☐ N/A

Tick one or more boxes

Lack of financial resources
Lack of candidates in field
HDR candidates are not suitably qualified/skilled
Competition from other private sector or higher education employers
Competition from overseas employment
Other (Please specify)

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
11. Does your organisation attempt to recruit HDR-qualified staff internationally?  
☐ Yes.  ☐ No.

If Yes, why?  
Tick one or more boxes

- Expertise
- Larger pool of qualified people
- Lack of suitably qualified domestic candidates
- Other (Please specify) ____________________________________
  _______________________________________________________
  _______________________________________________________

If yes, from which countries?

If No, why?  
Tick one or more boxes

- Difficulty in obtaining visas
- Suitably qualified domestic candidates available
- Language barriers
- Other (Please specify) ____________________________________
  _______________________________________________________
  _______________________________________________________

12. What skills do you believe HDR-qualified applicants bring to your organisation? How important are these skills?

Tick one or more boxes

<table>
<thead>
<tr>
<th>Skills</th>
<th>Importance</th>
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<tbody>
<tr>
<td>Research/Analytical skills (original thinking, research methodology,</td>
<td>☐</td>
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<tr>
<td>up-to-date knowledge, critical analysis)</td>
<td>☐</td>
</tr>
<tr>
<td>Theoretical knowledge (understanding of current research based</td>
<td>☐</td>
</tr>
<tr>
<td>knowledge in the field)</td>
<td>☐</td>
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</table>
Project management skills (goal setting, planning, organising, time management)

Personal skills (creativity, innovation, enterprise)

Communication skills

Commercialisation skills (marketing)

Problem solving skills

Team-working skills

Specific job-related skills (specialist IT skills or specialist knowledge)

Other skills (Please specify)

13. Do you believe that:

☐ All of your HDR staff are performing roles at least in part underpinned by their training;

☐ Some of your HDR staff are performing roles at least in part underpinned by their training;

☐ None of your HDR staff are performing roles at least in part underpinned by their training;

☐ Don’t know and could not reasonably estimate.

14. When first engaged, what skills, if any, did your HDR-qualified staff lack?

Tick one or more boxes

Skills lacking

Communication

Personal skills (willingness to learn, being able to work independently, motivation, initiative, flexibility)

Interdisciplinary knowledge

Teamwork

Problem solving

Project management

Learning

Self-management

Technology
15. What strategies did your organisation adopt or would like to adopt to address these skill gaps (if applicable)? (Please specify)

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

CAREER PROGRESSION AND SUPPORT

16. Does your organisation have career development programs or an identified career path for your HDR-trained staff?

☐ Yes  ☐ No

☐ Development programs and a path are provided but not in a formal arrangement

17. Does career progression for HDR-trained staff involve movement to a management/senior role within the organisation?

☐ Yes  ☐ No

☐ Unsure

18. Does your organisation provide support for further professional development (i.e. obtaining a HDR qualification)?

☐ Yes  ☐ No

☐ Not at the moment but happy to consider
19. Has your organisation collaborated with educational institutions to provide inputs for developing research training courses for higher degree by research programs?
☐ Yes.  ☐ No.

If Yes, what type of input?

Tick one or more boxes

- Lecturing
- Industry placements
- Cooperative Research Centres (CRCs) programs
- Career forums
- Supervision of graduate project
- Other (Please specify) ______________________________________
  _______________________________________________________
  _______________________________________________________
  _______________________________________________________

20. Has your organisation engaged HDR services from institutions or other parties on a contract or informal basis to undertake research projects?

☐ Yes  ☐ No. (Proceed to Q24)

If yes, why?

Tick one or more boxes

- Lacked internal expertise/skills
- To supplement internal expertise/skills
- Economical
- Utilised established relationships/arrangements
- Other (Please specify) ______________________________________
  _______________________________________________________
  _______________________________________________________
  _______________________________________________________

21. What type of organisations do you collaborate with?
21. Which organisations do you collaborate with?

Tick one or more boxes

- Publicly funded research agencies (e.g. CSIRO)
- Cooperative Research Centres (CRCs)
- Government research institutes
- Science Councils
- Australian higher education institutions
- International higher education institutions
- Other Australian companies
- International company
- Competitors and other businesses from the same industry
- Suppliers of equipment, materials, components or software
- Clients, customers or buyers
- Consultancy firm
- Other (Please specify) ______________________________________

________________________________________________________________________

________________________________________________________________________

22. What types of projects do you collaborate on?

Tick one or more boxes

- Research and development
- Project management
- Information Technology
- Marketing
- Scientific
- Other (Please specify) ________________________________

________________________________________________________________________

________________________________________________________________________

23. Have you encountered any barriers to collaborating with other organisations?
FUTURE RESEARCH ACTIVITIES

24. Does your organisation intend to increase or decrease research activity in the next 5 years?
   □ Increase  □ Decrease.  □ Will maintain current level of activity.
   Please provide reasons.

25. Do you see HDR-trained candidates (international and/or domestic) as contributing to your future research activities?
   □ Yes  □ No.
   If 'Yes', to a greater or lesser extent than at present and in what capacity (research, non-research)? Domestic or international candidates? Please provide comments.
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   If 'No', why not? Please provide comments:
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

Thank you for taking the time to complete this survey.
Major Industry Sectors

Agriculture, forestry and fishing
Mining
Manufacturing
Electricity, gas, water and waste services
Construction
Wholesale trade
Retail trade
Accommodation and food services
Transport, postal and warehousing
Information media and telecommunications
Financial and insurance services
Rental, hiring and real estate services
Professional, scientific and technical services
Administrative and support services
Public administration and safety
Education and training
Health care and social assistance
Arts and recreation services
Other services
Other Industry (Please specify)

Note: The complete classification, including detailed descriptions is available in 1292.0 - Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006 (Revision 1.0)
Please indicate the major industry sector of your organisation (Please select the industry sector that best fits your organisation from the list at Attachment A).

For the purposes of this questionnaire, research graduates are defined as below.

**Research graduates** – Those holding or in the process of obtaining a Doctorate (PhD) or Masters by Research from an Australian or international higher education institution.

Based on your experience and knowledge of research training and new research graduates please comment on the following.

1. **Please rate the importance of the following capabilities for your workforce**
   (4 very important; 3 important; 2 occasionally relevant; 1 not important).

<table>
<thead>
<tr>
<th>Capability importance</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced theoretical knowledge and analytical skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodological, research design and problem-solving skills in a particular research area</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced information processing skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of advanced information technologies and other research technologies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independence in research planning and execution consistent with the level of the research degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competence in the execution of protocols for research health and safety, ethical conduct and intellectual property</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skills in project management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teamwork</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic writing and oral communication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Awareness of the mechanisms for research results transfer to end-users
Scholarly dissemination through publications and presentations
Research policy
Research career planning.

Additional comments:
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

2. **Do you consciously seek out research graduates?**  □ Yes  □ No
   If yes, why? (Skills, specialisation etc)
   If no, why? (Insufficient funds, not necessary, etc)
____________________________________________________________________
____________________________________________________________________

3. **From contact with research graduates please rate them in terms of their capacity to meet the following capabilities.**
   *(4 exceeded; 3 met; 2 occasionally met; 1 not met).*

<table>
<thead>
<tr>
<th>Capability</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced information processing skills</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competence in the execution of protocols for research health and safety, ethical conduct and intellectual property</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Teamwork</td>
<td></td>
<td></td>
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<tr>
<td>------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic writing and oral communication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awareness of the mechanisms for research results transfer to end-users</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scholarly dissemination through publications and presentations</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research career planning.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional comments:

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

4. **What are the three key skills you seek in staff engaged in research/innovation and commercial/entrepreneurial related roles?**

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

5. **In your view, what contributions do research graduates make to your organisation as a whole?**

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

6. **What does your organisation offer potential research employees to recruit and retain them?**

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
7. Would you consider research graduates to be advantaged or disadvantaged in their career prospects compared to other employees?

- [ ] Advantaged
- [ ] Disadvantaged
- [ ] Neither

Additional comments:

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

8. In five or 10 years time what do you think will be the new skill sets required of workers in your business/industry, profession/organisation?

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

9. How, in light of future workforce needs in your business/industry, profession/organisation, should current research training provisions in Australia be changed? *(e.g.: more coursework, more work based experience, more interdisciplinary research, more exposure to commercial contexts)*

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

10. Any other comments?
Thank you very much for completing the questionnaire.
Key findings from Griffith University workshop participants’ surveys

The responses from the survey of business employing higher degree by research (HDR) staff in a research or non-research capacity have provided interesting and valuable information to inform the implementation of the research workforce strategy. Discussion questions are generated from the results of the survey to provide a deeper understanding of the needs and issues facing research employers.

The complete results from the analysis are at Attachment A. The key findings are listed below.

- A majority of organisations responding to the survey identified their main business activity as being in the professional, scientific and technical services sector.

- Organisations estimated the number of HDR qualified staff in their employ to total 264 HDR staff broken down by those working in research and non-research roles. The majority of staff, 203, work in non-research roles.

- The HDR personnel numbers were further broken down by gender. Results demonstrated a greater number of female (162) HDR qualified staff, compared to males (41), work in non-research roles.

- The results indicated that the primary job functions of HDR staff are in scientific research and development, management and research roles. This is expected given the majority of organisations are in the professional and scientific sector. However, it should be noted that this is a very small sample with one organisation identifying a large number of non-active researchers. Organisations believed a range of factors were important in attracting HDR staff including: remuneration, flexible working conditions, career progression and contract security.

- A lack of financial resources was cited as the major barrier to engaging HDR staff.

- Approximately half the responding organisations stated they recruit from overseas to source research expertise.

- The skills valued by employers in HDRs include: research/analytical skills, problem solving, theoretical knowledge and team working skills.

- Employers felt their HDR staff would benefit from skills development in a number of areas including: interdisciplinary knowledge, teamwork, problem solving and communication.

- 75% of respondents have collaborated with educational institutions by providing input to the development of research training degrees. For example through, lecturing, the Cooperative Research Centres program and research partnerships.

- 62% have engaged HDR services from institutions and other parties on a contract basis to supplement their internal expertise and knowledge and maximise established arrangements and partnerships instead of sourcing new services.

- A majority of the respondents indicated they intend to increase or maintain their level of research activity in the next five years.

Confidentiality

The information contained in survey responses will be dealt with in accordance with the Privacy Act 1988 and will be treated as confidential within the department. Results will only be released in aggregated form, except where required by law or parliamentary order.
Organisational Size

Q1 What is the size of your organisation (at the State/subsidiary/local office level)

- Less than 20 employees: 25%
- 20 to 199 employees: 37%
- 200 or more employees: 38%

Organisational Main Activity

Q2 Organisation's main activity

- Other services
- Education and training
- Administrative and support services
- Professional, scientific and technical services
- Transport, postal and warehousing
- Electricity, gas, water and waste services

Industry sector

% of responses
### Q3 Does your organisation conduct in-house research?

<table>
<thead>
<tr>
<th>Options</th>
<th>Frequency count</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>7</td>
<td>87.5</td>
</tr>
<tr>
<td>No. We do not conduct or use research.</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### Q4 Number of research and non research staff

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research</td>
<td>44</td>
<td>17</td>
<td>61</td>
</tr>
<tr>
<td>Non-research</td>
<td>41</td>
<td>162</td>
<td>203</td>
</tr>
</tbody>
</table>

### Q5 Does the above distribution of HDR-qualified staff reflect your organisation/office research needs

<table>
<thead>
<tr>
<th>Options</th>
<th>Number of responses</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>6</td>
<td>75.0</td>
</tr>
<tr>
<td>Somewhat</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Unsure</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Q6 What are the job functions of HDR qualified staff?

<table>
<thead>
<tr>
<th>Options</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research roles</td>
<td>3</td>
</tr>
<tr>
<td>Scientific research and development</td>
<td>4</td>
</tr>
<tr>
<td>Management roles</td>
<td>4</td>
</tr>
<tr>
<td>Engineering</td>
<td>2</td>
</tr>
<tr>
<td>Other*</td>
<td>2</td>
</tr>
</tbody>
</table>

*Other job functions include education and training, research support and sourcing funding.

Recruitment and Retention of HDR Trained Staff

Q7 Does your organisation:

<table>
<thead>
<tr>
<th>Options</th>
<th>Number of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actively seek HDR graduates for research roles</td>
<td>1</td>
</tr>
<tr>
<td>Actively seek HDR graduates for non-research roles</td>
<td>0</td>
</tr>
<tr>
<td>Both of the above</td>
<td>5</td>
</tr>
<tr>
<td>Employ qualified candidates with research skills regardless whether they have a HDR</td>
<td>2</td>
</tr>
</tbody>
</table>
Q8 How does your organisation recruit HDR-qualified staff?

<table>
<thead>
<tr>
<th>Options</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet advertising</td>
<td>6</td>
</tr>
<tr>
<td>Newspaper advertisement</td>
<td>5</td>
</tr>
<tr>
<td>Personal or work contact/network</td>
<td>5</td>
</tr>
<tr>
<td>Liaise with educational institutions through career counsellors</td>
<td>3</td>
</tr>
<tr>
<td>Private employment agency</td>
<td>2</td>
</tr>
<tr>
<td>Professional association contact</td>
<td>2</td>
</tr>
<tr>
<td>Public service contact</td>
<td>2</td>
</tr>
<tr>
<td>Other*</td>
<td>2</td>
</tr>
<tr>
<td>Presentations at universities</td>
<td>1</td>
</tr>
<tr>
<td>Research journal advertisement</td>
<td>1</td>
</tr>
</tbody>
</table>

*Organisations also recruit through summer internships, graduate and postgraduate sponsorships.

Q9 Which factors, do you believe contribute to your organisation’s ability to attract and retain HDR-qualified staff?

<table>
<thead>
<tr>
<th>Options</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attractive remuneration package</td>
<td>5</td>
</tr>
<tr>
<td>Flexible working conditions</td>
<td>4</td>
</tr>
<tr>
<td>Organisational prestige</td>
<td>4</td>
</tr>
<tr>
<td>Career progression</td>
<td>4</td>
</tr>
<tr>
<td>Tenure contract security</td>
<td>3</td>
</tr>
</tbody>
</table>
Research Skills for an Innovative Future: Business Workshop Survey Results

<table>
<thead>
<tr>
<th>Factor</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management support</td>
<td>3</td>
</tr>
<tr>
<td>Access to advanced technology</td>
<td>3</td>
</tr>
<tr>
<td>Collaboration opportunities</td>
<td>3</td>
</tr>
<tr>
<td>Opportunity to attend conferences</td>
<td>2</td>
</tr>
<tr>
<td>Mentoring</td>
<td>2</td>
</tr>
<tr>
<td>Career development program</td>
<td>1</td>
</tr>
<tr>
<td>Time to prepare publications</td>
<td>1</td>
</tr>
<tr>
<td>Scholarships/work experience</td>
<td>1</td>
</tr>
<tr>
<td>Employer funded study</td>
<td>1</td>
</tr>
</tbody>
</table>

Q10 Factors that impede an organisation’s ability to engage domestic HDR-qualified staff

Q11 Does your organisation attempt to recruit HDR-qualified staff
### Q11a Reasons for recruiting HDR staff internationally

<table>
<thead>
<tr>
<th>Options</th>
<th>Number of responses</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>4</td>
<td>50.0</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>37.5</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>87.5</td>
</tr>
<tr>
<td>Missing answer</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>100.0</td>
</tr>
</tbody>
</table>

HDRs are recruited from overseas for a number of reasons. Fifty per cent of respondents stated it was for the expertise, 25% sought a larger pool of qualified people 12.5% believed there was a lack of suitably qualified domestic candidates in Australia (see chart below).

The United States of America, Europe and Asia are the destinations where HDRs are most commonly sought.

Respondents that did not recruit internationally believed there are suitably qualified domestic HDR personnel.
Research/analytical, theoretical knowledge, problem solving and team working skills are considered some of the skills HDR personnel bring to organisations.
Q13 Do you believe that:

<table>
<thead>
<tr>
<th>Options</th>
<th>Number of responses</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All of your HDR staff are performing roles at least in part underpinned by their training.</td>
<td>5</td>
<td>62.5</td>
</tr>
<tr>
<td>Some of your HDR staff are performing roles at least in part underpinned by their training.</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Missing answer</td>
<td>2</td>
<td>25.0</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Q14 The skills HDR qualified staff lacked when first engaged

<table>
<thead>
<tr>
<th>Skills</th>
<th>Number of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interdisciplinary knowledge</td>
<td>5</td>
</tr>
<tr>
<td>Teamwork</td>
<td>4</td>
</tr>
<tr>
<td>Problem solving</td>
<td>4</td>
</tr>
<tr>
<td>Communication</td>
<td>3</td>
</tr>
<tr>
<td>Technology</td>
<td>3</td>
</tr>
<tr>
<td>Other*</td>
<td>2</td>
</tr>
<tr>
<td>Personal skills</td>
<td>1</td>
</tr>
<tr>
<td>Project management</td>
<td>1</td>
</tr>
<tr>
<td>Commercialisation</td>
<td>1</td>
</tr>
</tbody>
</table>

40
Q15 What strategies did your organisation adopt or would like to adopt to address the above skills gaps?

Organisations noted a number of ways that they try to meet the skills needs of their HDR staff. Through training workshops in stakeholder, project and program management to providing mentoring and support services and having regular feedback meetings. Some respondents also mentioned that it would be desirable to enhance the collaborative skills of their HDR employees within a commercialisation environment.

Career Progression and Support

| Q16 Does your organisation have career development programs or an identified career path for your HDR-trained staff? |
|---|---|---|
| Options | Number of responses | Percentage (%) |
| Yes | 3 | 37.5 |
| No | 1 | 12.5 |
| Development programs and a path are provided but not in a formal arrangement | 3 | 37.5 |
| Missing answer | 1 | 12.5 |
| Total | 8 | 100.0 |

| Q17 Does career progression for HDR-trained staff involve movement to a management/senior role with the organisation |
|---|---|---|
| Options | Number of responses | Percentage (%) |
| Yes | 4 | 50.0 |
| No | 2 | 25.0 |
| Not always | 1 | 12.5 |
| Missing answer | 1 | 12.5 |
| Total | 8 | 100.0 |
Q18 Does your organisation provide support for further professional development (i.e. obtaining a HDR qualification)?

<table>
<thead>
<tr>
<th>Options</th>
<th>Number of responses</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>5</td>
<td>62.5</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Not at the moment but happy to consider</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Collaboration

For **Question 19** six (6) out of eight organisations indicated that they collaborate with educational institutions to provide input to the development of research training courses for HDR programs. Two (2) respondents indicated they did not collaborate with other organisations.

Q20 Has your organisation engaged HDR services from institutions or other parties on a contract basis?

<table>
<thead>
<tr>
<th>Options</th>
<th>Number of responses</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>5</td>
<td>62.5</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Missing</td>
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</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>100.0</td>
</tr>
</tbody>
</table>
The most common reasons for engaging HDR services from third parties (see chart below) are: to supplement internal expertise, maximise established arrangements and partnerships instead of sourcing new services, a lack of internal expertise and for economical reasons.

**Q20a Common reasons for engaging HDR services from institutions or other parties on a contract or informal basis to undertake research projects**

<table>
<thead>
<tr>
<th>Reason</th>
<th>Number of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplement internal expertise/skills</td>
<td>4</td>
</tr>
<tr>
<td>Utilise established relationships/arrangements</td>
<td>3</td>
</tr>
<tr>
<td>Lack of internal expertise/skills</td>
<td>2</td>
</tr>
<tr>
<td>Economical</td>
<td>1</td>
</tr>
</tbody>
</table>

**Q21 What types of organisations do you collaborate with?**

<table>
<thead>
<tr>
<th>Options</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Publicly funded research agencies</td>
<td>6</td>
</tr>
<tr>
<td>Australian higher education institutions</td>
<td>6</td>
</tr>
<tr>
<td>Government research institutes</td>
<td>5</td>
</tr>
<tr>
<td>Other Australian companies</td>
<td>5</td>
</tr>
<tr>
<td>International company</td>
<td>5</td>
</tr>
</tbody>
</table>
Research Skills for an Innovative Future: Business Workshop Survey Results

Cooperative Research Centres 4
Competitors and other businesses from the same industry 4
Suppliers of equipment, materials, components 4
Clients, customers or buyers 4
Consultancy firm 4
Science Councils 1
Other* 2

*Other organisations include the Learned Societies such as the International Council on Large Electrical Systems.

Q22 What type of projects do you collaborate on?

<table>
<thead>
<tr>
<th>Options</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>R &amp; D</td>
<td>6</td>
</tr>
<tr>
<td>Project management</td>
<td>5</td>
</tr>
<tr>
<td>Scientific</td>
<td>4</td>
</tr>
<tr>
<td>Other*</td>
<td>3</td>
</tr>
<tr>
<td>Information Technology</td>
<td>2</td>
</tr>
<tr>
<td>Marketing</td>
<td>2</td>
</tr>
</tbody>
</table>

*Other projects include engineering and industry initiatives especially around environmental/sustainability programs.

Q23 Have you encountered any barriers to collaborating with other organisations?

When collaborating with academic institutions, organisations mentioned that sometimes different expectations on outcomes and timeframes, a lack of delivery focus, alignment of priorities and different rigors in project management brought about challenges. Intellectual property issues also posed a problem.
Research Skills for an Innovative Future: Business Workshop Survey Results

Q24 Does your organisation intend to increase or decrease research activity in the next 5 years?

<table>
<thead>
<tr>
<th>Options</th>
<th>Number of responses</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase</td>
<td>4</td>
<td>50.0</td>
</tr>
<tr>
<td>Will maintain current level of activity</td>
<td>3</td>
<td>37.5</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The availability of resources will impact on the potential to increase or decrease an organisation’s research activity in the future. Some organisations intend to build their research profile under defined research objectives and goals.

Q25 Do you see HDR-trained candidates (international or domestic) contributing to your future research activities?

<table>
<thead>
<tr>
<th>Options</th>
<th>Number of responses</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>7</td>
<td>87.5</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>100.0</td>
</tr>
</tbody>
</table>

If an organisation’s objective is to grow its research profile, demand for staff with a sophisticated understanding of research needs will increase. HDRs are, in this sense, well placed to contribute to the research activity of the business.
To note

- Limitations
  - Small sample size
  - Self-select survey which may bias results

- Results are a picture of those who participated
Question 1: Capabilities important to the research workforce

- Advanced theoretical knowledge
- Methodological research design
- Advanced information processing skills
- Independence in research planning
- Competence in the execution of protocols
- Scholarly dissemination
- Research career planning

Question 3: Capacity of research graduates to meet the needs of organisation capabilities

- Advanced theoretical knowledge
- Methodological research design
- Advanced information processing skills
- Independence in research planning
- Competence in the execution of protocols
- Scholarly dissemination
- Research career planning
Interesting findings

- Overwhelmingly respondents stated they actively seek out research trained graduates: 12 Yes 3 No

- Top 3 skills sought:
  - Critical thinking
  - Aptitude to learn
  - Application
QUT Research Workforce Collated
Responses from Survey
March 2012

Please indicate the major industry sector of your organisation (Please select the industry sector that best fits your organisation from the list at Attachment A) ___

Health care and social assistance (4)
Agriculture, forestry and fishing
Natural Heritage- Geosciences-Geotourism
Education and training (2)
ICT research
Professional, scientific and technical services (Biomedical research)(2)
Public Administration and Safety;
Mining (R&D)
Construction.
Please rate the importance of the following capabilities for your workforce
(4 very important; 3 important; 2 occasionally relevant; 1 not important).

<table>
<thead>
<tr>
<th>Capability importance</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced theoretical knowledge and analytical skills</td>
<td>12</td>
<td>7</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Methodological, research design and problem-solving skills in a particular research area</td>
<td>13</td>
<td>4</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Advanced information processing skills</td>
<td>10</td>
<td>7</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Knowledge of advanced information technologies and other research technologies</td>
<td>8</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Independence in research planning and execution consistent with the level of the research degree</td>
<td>10</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Competence in the execution of protocols for research health and safety, ethical conduct and intellectual property</td>
<td>6</td>
<td>13</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Skills in project management</td>
<td>5</td>
<td>8</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Teamwork</td>
<td>9</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic writing and oral communication</td>
<td>8</td>
<td>5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Awareness of the mechanisms for research results transfer to end-users</td>
<td>5</td>
<td>8</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Scholarly dissemination through publications and presentations</td>
<td>8</td>
<td>1</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Research policy</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Research career planning</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>1</td>
</tr>
</tbody>
</table>

Additional capabilities identified:

Work place experience in chosen field (practical skills) (4)

Stakeholder identification and engagement skills (external communication skills) (4)

Ability to choose projects correctly + primary supervisors (4)

Passion and dedication (4)

Technical skills and knowledge of technologies.
Do you consciously seek out research graduates? 12 Yes 3 No

If yes, why? (Skills, specialisation etc)
If no, why? (Insufficient funds, not necessary, etc)

(Note: Many of the respondents are research based organisations and therefore seek out HDRs precisely because of their research skills)
However, comments from the public service, a big employer of HDRs, indicated that the difference in working environment often required a need for additional supervision. Also, HDRs came in with a different communication (esp writing) styles. When HDRs are hired, it is not just because of their research degrees but also because of their work experience.
Desirable skills include competency to promote data and information into the knowledge domain.

From contact with research graduates please rate them in terms of their capacity to meet the following capabilities.
(4 exceeded; 3 met; 2 occasionally met; 1 not met).

<table>
<thead>
<tr>
<th>Capability capacity</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced theoretical knowledge and analytical skills</td>
<td>3</td>
<td>8</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Methodological, research design and problem-solving skills in a particular research area</td>
<td>3</td>
<td>7</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Advanced information processing skills</td>
<td>1</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Knowledge of advanced information technologies and other research technologies</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independence in research planning and execution consistent with the level of the research degree</td>
<td>2</td>
<td>7</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
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<td>8</td>
<td>6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Skills in project management</td>
<td>1</td>
<td>5</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Teamwork</td>
<td>1</td>
<td>5</td>
<td>8</td>
<td>2</td>
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<td>Academic writing and oral communication</td>
<td>3</td>
<td>6</td>
<td></td>
<td></td>
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<td>6</td>
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<td>2</td>
<td></td>
</tr>
<tr>
<td>Scholarly dissemination through publications and presentations</td>
<td>1</td>
<td>8</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Research policy</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
Most of the capabilities are highly valued but of concern is the gap between the capabilities and their presence among HDRs.

Other comments:
Quality of foreign postgraduate students has outperformed domestic students.

Identified gaps in education are 1) bridging secondary to tertiary education and 2) bridging the u/g to p/g barrier.

What are the three key skills you seek in staff engaged in research/innovation and commercial/entrepreneurial related roles?

The top skills identified were critical thinking and aptitude to learn and application. In the second band were communication skills, experience, methodology and understanding of user needs. Finally mentioned but not by many were teamwork, technical skills, innovation/creativity, negotiation skills and the capacity to work independently.

It is worth noting that user needs, communicating with external stakeholders, and translation of research into an applied context keep emerging throughout. This is a slightly different tack than the usual ‘communication’ skills that tend to emerge.

Also mentioned were the skills necessary to move form a student to a mentor/supervisor.

In your view, what contributions do research graduates make to your organisation as a whole?

Not unexpectedly, the majority of responses were based on R & D contributions. Other contributions HDR make are in terms of innovation/creativity; enthusiasm & fresh ideas; improving a knowledge base and a capacity to work in teams.

Two additional comments of interest:

i) Concern was expressed that HDRs were becoming technicians and independent thinking and creative skills weren’t being developed as strongly as they should be; and

ii) HDRs don’t handle practical skills required ie project management and stakeholder communication
**What does your organisation offer potential research employees to recruit and retain them?**

Responses included:
1. Opportunity to work on national/international projects
2. Networking, teamwork, development of skills
3. Public service benefits
4. Flexible working conditions – ‘not a university culture’
5. Short and medium term projects depending upon the incoming money.

The message is that there is no distinct career pathway and very little security of employment following HDR completion. This is a particular problem for those who continue to conduct research because the emphasis is on soft money and short-term contracts.

**Would you consider research graduates to be advantaged or disadvantaged in their career prospects compared to other employees?**

7 Advantaged 3 Disadvantaged 5 Neither

Other than research based organisations requiring researchers, other employers of HDRs could not identify why they considered HDRs advantaged in their career prospects. One response indicated that clients prefer HDRs but there was no strong view as to what the research background offered in terms of a career.

**In five or 10 years time what do you think will be the new skill sets required of workers in your business/industry, profession/organisation?**

The majority of responses focussed on ‘basic skill sets’ ie communication, teamwork, with a special emphasis on ICT.
Also highly mentioned was the importance of the transfer of knowledge between industry and academia (and in the public service context, the translation of research into policy); The importance of the capacity to manage large data sets, undertake economic analysis/cost benefit analyses, the application of analytic tools also came up.
Some reference to interdisciplinary and transferable skills.
Finally concern as expressed about future ‘outsourcing ‘ of research to commercial bodies.

**How, in light of future workforce needs in your business/industry, profession/organisation, should current research training provisions in Australia be changed?**
(e.g.: more coursework, more work based experience, more interdisciplinary research, more exposure to commercial contexts)

Overwhelmingly, future workforce needs involve the application of research/research skills to the workplace. HDRs need to be able to communicate their research to external stakeholders ie the full cycle – from actual research to application. This was also mentioned in the public sector (eg museums). Innovation and work based experience were essential to future workforce needs. Therefore more opportunities for secondment, work based experience, internships, were recommended, particularly for postgraduate placements with opportunities for mentoring. Co-funded research between government bodies and industry are necessary.

**Any other comments?**

The need to revive or create an understanding of the importance of research ie objective evidence is needed. This has been lost because often there is a short term focus within ‘market industries’. The understanding of context and history leads to innovation.

Need to ensure basic grammar and mathematical skills sets are in place.

More comments on increasing opportunities for exchange and secondments between researchers, academia, industry and government.

*Thank you very much for completing the questionnaire.*