The Evolution of Postgraduate Research Education

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Overview

1. The ARC
2. Current postgraduate education
3. Industry
4. ARC funding programs
5. Challenges
6. Opportunities
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ARC developments

- New schemes (ITRP, Centres of Excellence for 2014, Future Fellowships round 6, LP14)
- Current schemes (DP, IN, DE, FT, LE)
- Revision and harmonisation of funding rules
- Updating of assessor database (FoR codes & keywords, new assessors)
- Open access, open data, research impact
- New CEO – Prof Aidan Byrne (May 2012)
- New Executive Director for EMI (January 2013)
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Current Postgraduate Education

- Considerable increase in the number of PhD students
- Mostly in basic research
- But most will find employment in other areas
Current Postgraduate Education

- What are the (eventual) destinations of PhD students?
  - academia
  - basic research (CSIRO, ANSTO, research institutes)
  - industry
  - teaching
  - government
  - business

- How many end up in academia?
Current Postgraduate Education

- Current postgraduate education already provides students with a variety of skills (ability to work independently, analysis, information gathering, synthesis and communication)
- But perhaps unrecognised by employers, and by students themselves
- Employers regard PhD graduates as overqualified, and too specialised
- Students do question whether a PhD will get them a better job ("Why do a PhD in science?")
Current Postgraduate Education

- Should we look at pathways towards broader employment?
- Should the ACDS look at a national scheme for postgraduate student industry experience?

(Postgraduate internships in industry may have benefits for both PhD students and for industry.)
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3. Why collaborate with industry?
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Why collaborate with industry?

"To develop a powerful research and innovation system that drives economic and social progress, universities will:

- review how best to train PhD graduates for employment in the broader economy and increase the number of international students enrolled in PhDs
- extend and deepen collaboration and connections with the end users of research
- expand research outreach through strategic engagement and wider access to research outputs."

(A Smarter Australia – a policy paper released by Universities Australia on 27 February 2013)
Why collaborate with industry?

In order to achieve the innovation goals that have been set for this country, Australia will need more science-oriented people in leadership positions across many sectors of government and industry.

(STEM in the national interest: a strategic approach, Office of the Chief Scientist, July 2013)
Collaboration with industry

- Translational research = translating basic research knowledge into an idea about a product or service
NHMRC

- A policy on Research Translation
- A Symposium on Research Translation, 2-3 October 2013
- A Research Translation 'Faculty'
- Funding schemes:
  - Partnerships
  - Translating Research Into Practice Fellowships
  - Targeted calls for research
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Centres of Excellence

- Objectives: To
  e. provide high-quality postgraduate and postdoctoral training environments for the next generation of researchers;
  g. establish Centres of such repute in the wider community that they will serve as points of interaction among higher education institutions, governments, industry and the private sector generally.

- Can request funding for stipends for postgraduate students
Linkage Projects

- Objective: To promote *d. growth of a national pool of world-class researchers to meet the needs of the broader Australian innovation system*;

- Can request funding for stipends for postgraduate students
Industrial Transformation Training Centres

- Objectives: To
  a. foster opportunities for Higher Degree by Research candidates and postdoctoral fellows to pursue industrial training and to enhance competitive research in collaboration between universities and organisations outside the Australian higher education sector; and
  b. supplement the capabilities of industries and other research end-users.

- Each Training Centre – at least 10 HDR students and 3 postdoctoral fellows.
Industrial Transformation Training Centres

Over the life of the five year program the ARC will:

• establish up to 50 Training Centres nationwide
• support Higher Degree by Research candidates and postdoctoral researchers in gaining real-world practical skills through placement in industry
• provide a minimum of $600,000 and a maximum of $1 million per year for three years for each Training Centre.
Industrial Transformation Training Centres

Round 1 (May 2013)

- Innovative wine production (Uni Adelaide) $2.4m
- Molecular technology (Macquarie Uni) $2.1m
- The food industry and Asia (UQ) $2.7m
- Advanced technologies in food manufacture (UNSW), $2.1m
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How to engage with industry?

- The first time that many academics engage with industry is when they ask them for money.
- Need to build relationships.
How to engage with industry?

- Criteria for successful collaborations:
  - choose the right partners
  - choose the right time
  - recognise the importance of individuals (act as champions for a partnership)
  - have good commercially-oriented project management on both sides
  - have simple agreements that can be executed quickly
  - have a common goal (and mutual understanding)
  - align the expectations of both parties

('Translating Research into Economic Benefits for Australia: Rethinking Linkages', ATSE Position Paper, October 2013)
Challenges

- Cooperative Research Centre (CRC) program: complex legal negotiations, up-front financing, time commitment, long funding turnaround
- Linkage Project grants: time commitment and matching funding, control and incentives are with the academics
- Industrial Transformation Training Centres: OK, has potential

('Translating Research into Economic Benefits for Australia', ATSE Position Paper, October 2013)
How to engage with industry

- CSIRO Enterprise Connect 'Researchers in Business': allows researchers to undertake placements in business to develop new ideas or solve problems
- State government initiatives (e.g. Vic, QLD)
- Other countries (e.g. USA, UK)

('Translating Research into Economic Benefits for Australia', ATSE Position Paper, October 2013)
Challenges

Past Secretaries of the Department of Prime Minister and Cabinet:

- Terry Moran: “I’ve given up long since seeking to get pieces of research done by academics as a contribution to important policy problems because it’s generally late and in a form that then has to be further translated before it can be used in government.”

- Peter Shergold: “Why does Australia’s large public investment in research and development contribute so little to addressing the political response to the nation’s economic and social challenges?”
Challenges

- Science academics currently depend on the role of discovery research and grant winning to maintain their reputation.
- Basic research is the dominant indicator of academic performance in science.
- This means publications, which in turn depend upon grants from the ARC and NHMRC, and having postgraduate research students.
Challenges

- **Academics** are reluctant to engage with industry.
- "ERA emphasises publications in highly-ranked journals."
- "Need a complementary measure to the ERA which rewards industry collaboration."

('Translating Research into Economic Benefits for Australia', ATSE Position Paper, October 2013)
ERA 2010 & 2012 National Reports
Income and Quality

HERDC income Cat 1-3 by rating - 2010

- National Competitive G
- Other Public
- Industry
Income and Quality

HERDC income Cat 1-3 by rating - 2012

- National Competitive
- Other Public
- Industry

ERA rating
### ERA 2012: Two Digit FoR codes

#### No. of Universities rated at world standard or higher

<table>
<thead>
<tr>
<th>FoR Code</th>
<th>World standard</th>
<th>Above world standard</th>
<th>Well above world standard</th>
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<tbody>
<tr>
<td>01 Mathematical Sciences</td>
<td>11</td>
<td>8</td>
<td>3</td>
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<tr>
<td>02 Physical Sciences</td>
<td>10</td>
<td>4</td>
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<tr>
<td>03 Chemical Sciences</td>
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<td>04 Earth Sciences</td>
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<td>14 Economics</td>
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<tr>
<td>15 Commerce, Management, Tourism and Services</td>
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<tr>
<td>16 Studies In Human Society</td>
<td>11</td>
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<tr>
<td>17 Psychology and Cognitive Sciences</td>
<td>10</td>
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<tr>
<td>18 Law and Legal Studies</td>
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<tr>
<td>19 Studies In Creative Arts and Writing</td>
<td>12</td>
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<tr>
<td>20 Language, Communication and Culture</td>
<td>12</td>
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<tr>
<td>21 History and Archaeology</td>
<td>15</td>
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<tr>
<td>22 Philosophy and Religious Studies</td>
<td>12</td>
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Quality is multidimensional

- Quality in ERA is multidimensional
- Publishing profile, income sources, background statements and applied measures all contribute to understanding the UoE
- Applied/researcher-led research is recognised in ERA
- Quality underpins evaluation across the spectrum of research activity
ERA is multidimensional

- Citation data
- Peer assessment
- HERDC Category income 2-4
- Research Commercialisation income
- Patents
- Plant breeder’s rights
- NHMRC endorsed guidelines
- Non-traditional research outputs (extended trial in ERA 2012)
Universities are multi-dimensional

We need a better and more complete description of activity.
Mapping Engagement:

Linkage Projects vs. Discovery Projects

Strength in scheme:
- avg. p.a. $LP + $DP

Linkage: $112m
Discovery: $50m
Strength in scheme: $12m
Engagement by Cohort
Strength in Linkage and Discovery Schemes

- Group of Eight
- Non-Aligned
- Innovative Research Universities
- Regional Universities Network
- Australian Technology Network

Discovery: [Red]  Linkage: [Blue]
Where does the impact begin?

Academic activity

Impact

$\$ $

Salaries
researchers
technicians

Buy
equipment,
books, ICT

Papers

Patents

New
Government
Policy

New Research
Paradigm

Spin-off
Company
ERA future directions...

• Expand ERA metrics: research application, knowledge exchange and collaboration
• Expand eligible research outputs to include a greater range of applied outputs
• Focus on pathways to impact
• As with existing ‘quality’ indicators, approaches must be tailored to fit the field of research concerned
• Consultation with the sector and its stakeholders will be critical
Challenges for collaboration with industry

- ERA – what more needs to be done to effectively take account of impact?
- How can universities diversify performance and promotion criteria and reward strategic collaboration with industry?
- How can governments encourage industry to engage with publicly funded research?
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Opportunities for Science

- Faculties of Science could expand further into the area of translational research.
- The ACDS could hold forums to explore:
  - the concept of industry internships in science PhD studies
  - the variety of industry (and other?) experiences that might be available
  - how best for PhD students to access this industry experience
  - the role of PhD students in translational research
  - how the ARC can help encourage this (funding schemes? ERA?)
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