Impact of the ACOLA Review on Science PhDs

Professor Robyn Owens, Deputy Vice Chancellor Research

Expert Working Group – two members from each of the four learned academies, and Chaired by John McGagh

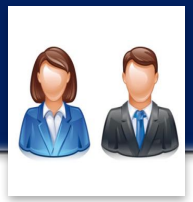
85 submissions + 6 public forums + forums with ACGR and DVCs-R + 84 interviews

Close connection with 'Watt' Review investigating broader financing issues relating to research in Higher Education

Three pillars

HDR training produces high quality researchers capable of succeeding in different sectors

The Person



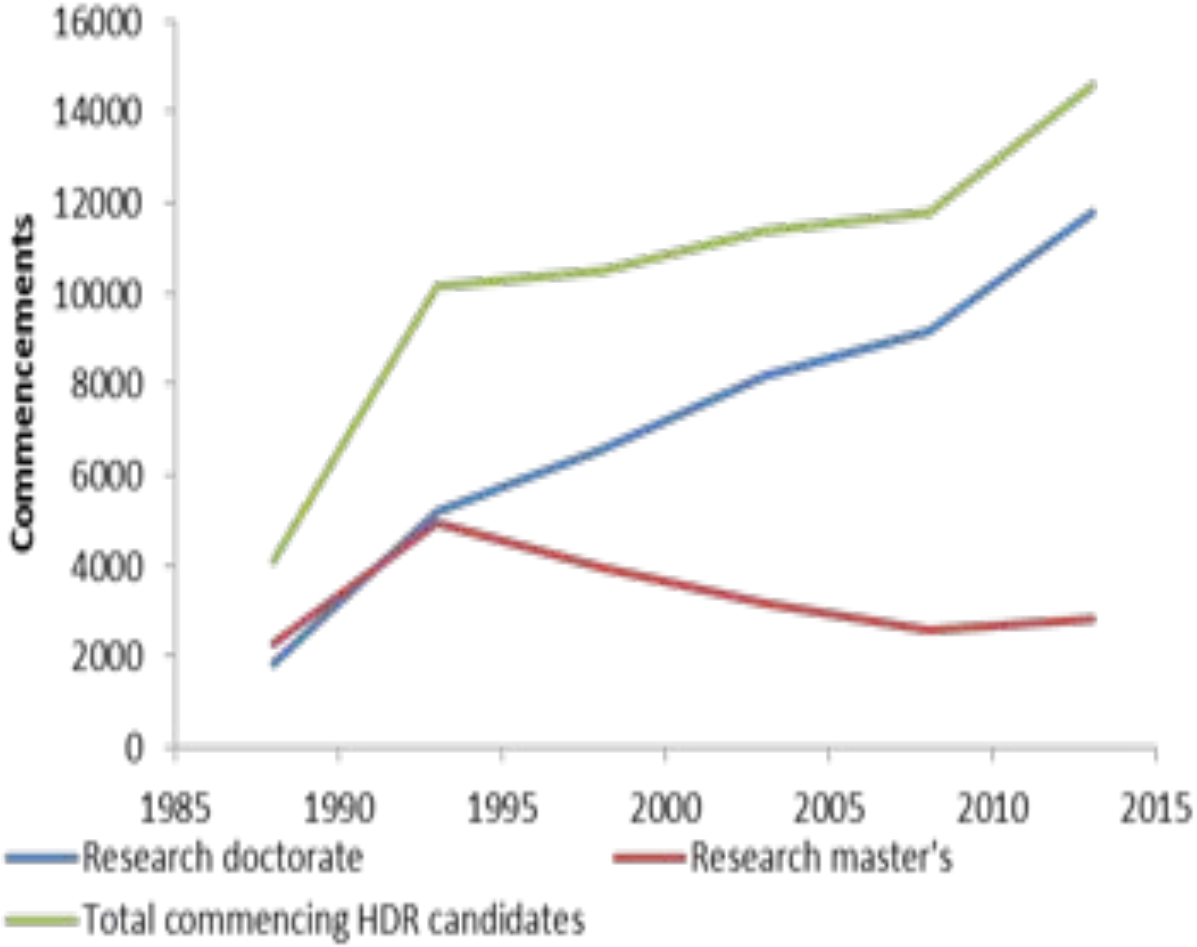
HDR training contributes to Australia's future prosperity and wellbeing

The Nation

How to structure the research training system to achieve the above

The System

Commencing enrolments

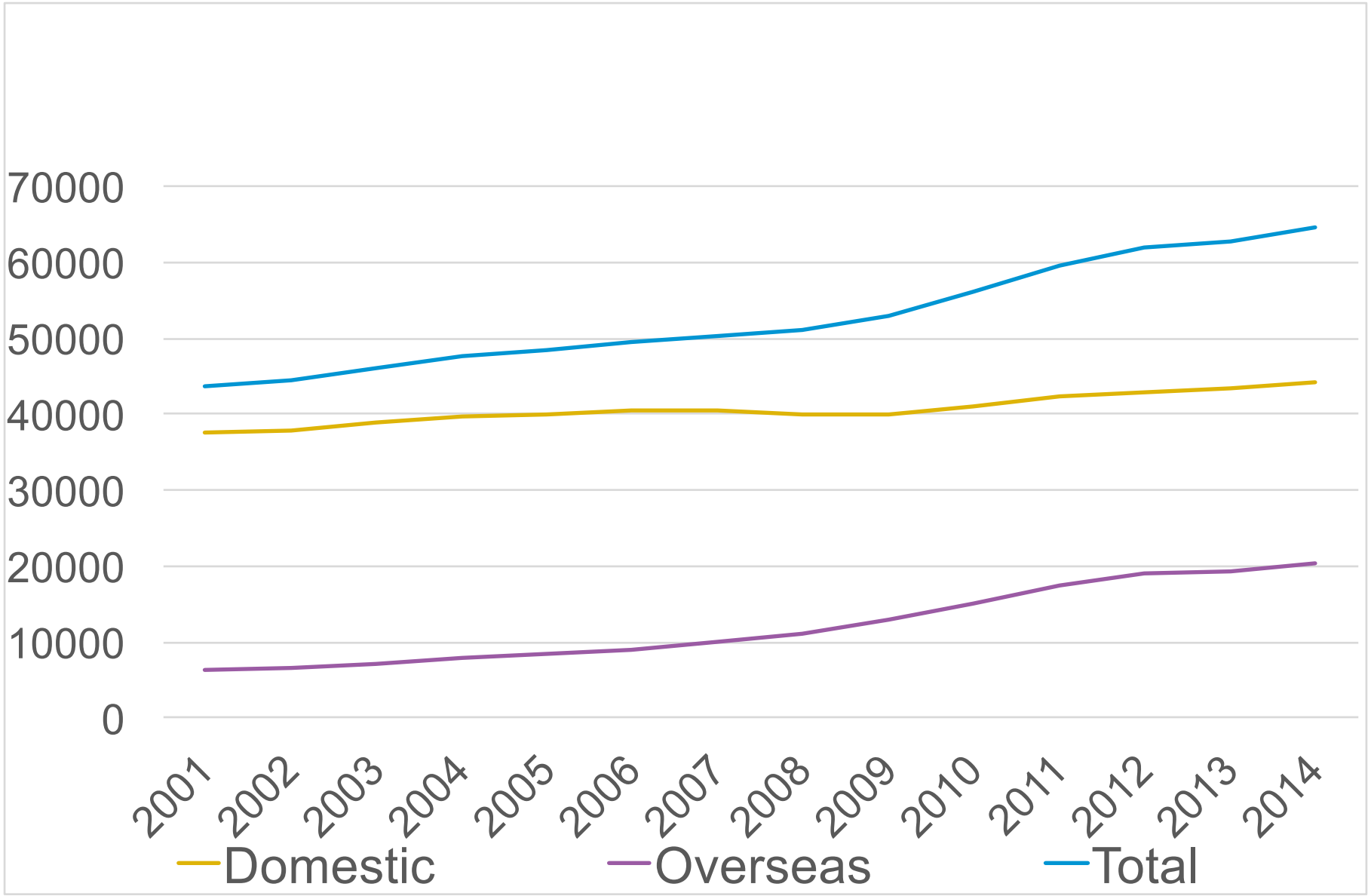


Huge increase in HDR numbers

Mostly doctorates and proportion increasing

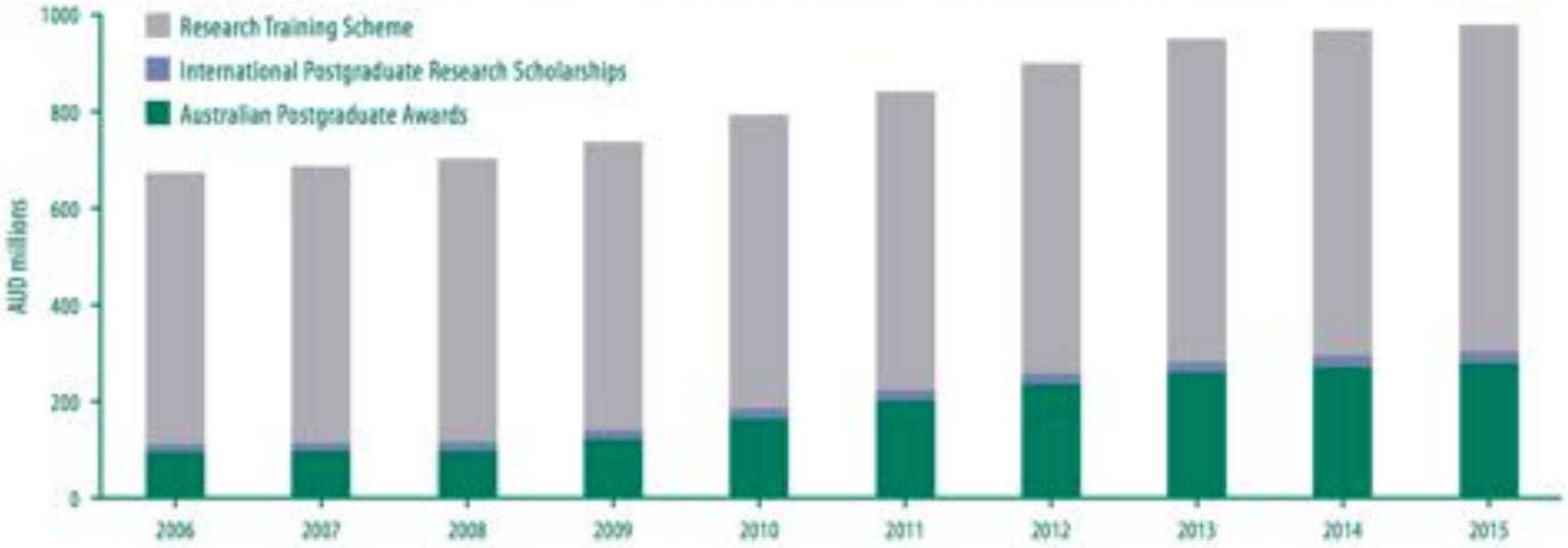
Source: Department of Education and Training 2015

Total enrolments: international candidates increasingly important



Government Support

Figure 2: Australian Government support for research training through the research block grants



Source: Department of Education and Training (2015f) and Department of Education and Training (2015i).

Table 1: Number of Australian Postgraduate Awards awarded each year between 2006 and 2015

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Australian Postgraduate Awards	1561	1581	1584	2584	3069	3270	3500	3500	3499	3497

Note: The number of International postgraduate Research Scholarships has remained constant at 330 every year.

Source: Department of Education and Training (2015i).

By Field of Education

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Table 2: Proportion of domestic and overseas HDR candidates by broad Field of Education

Field of Education	Proportion of enrolment (per cent)	
	Domestic	International
Natural and Physical Sciences	63	37
Information Technology	51	49
Engineering and related technologies	47	53
Architecture and building	72	28
Agriculture Environmental and related studies	57	43
Health	80	20
Education	79	21
Management and Commerce	60	40
Society and Culture	81	19
Creative Arts	90	10
TOTAL	69	31

Source: Department of Education and Training (2015f).

Completions

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Table 3: HDR completions by field of education in 2013

Field of Education	Doctorate by Research	Masters by Research	Percentage of total HDR completions
Natural and Physical Sciences	1748	207	21
Information Technology	313	45	4
Engineering and related technologies	1113	245	15
Architecture and building	99	18	1
Agriculture Environmental and related studies	344	51	4
Health	1140	220	15
Education	482	95	6
Management and Commerce	592	65	7
Society and Culture	1615	227	20
Creative Arts	341	249	6
TOTAL	7787	1422	100

Source: Department of Education (2015) Selected Higher Education Statistics—2013 Candidate Data: 2013 Award completions.

Where from, and where to?

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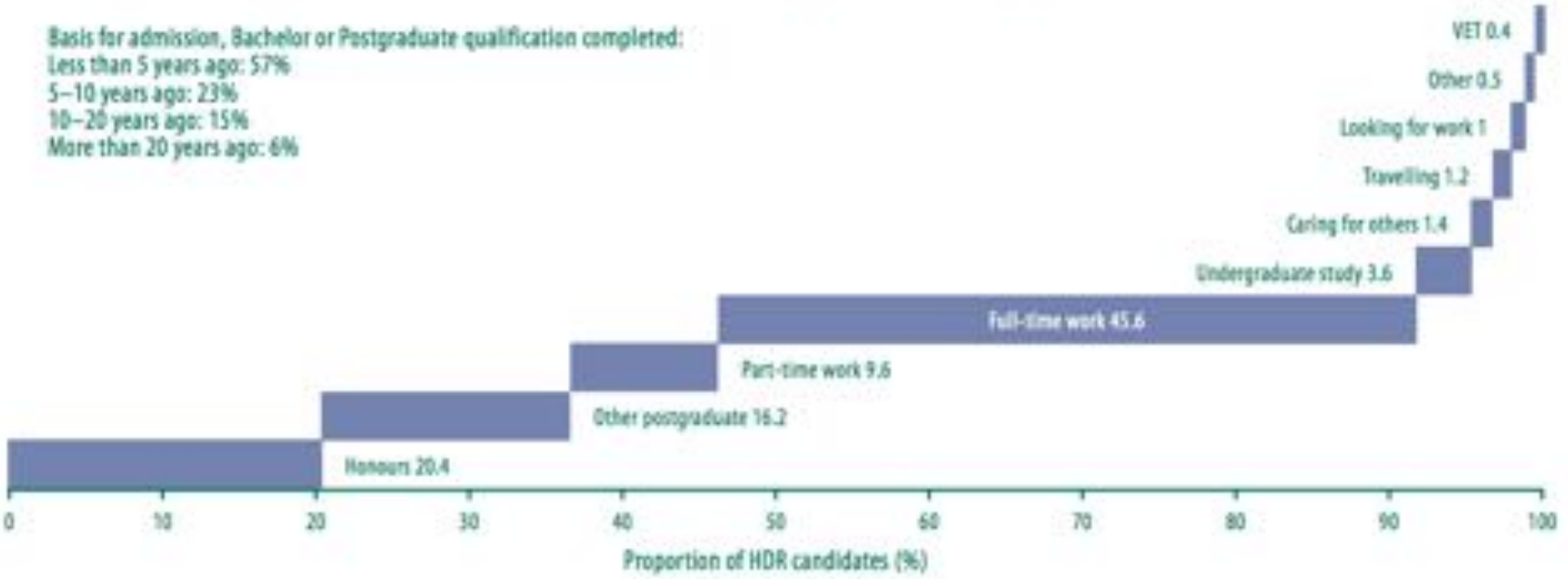
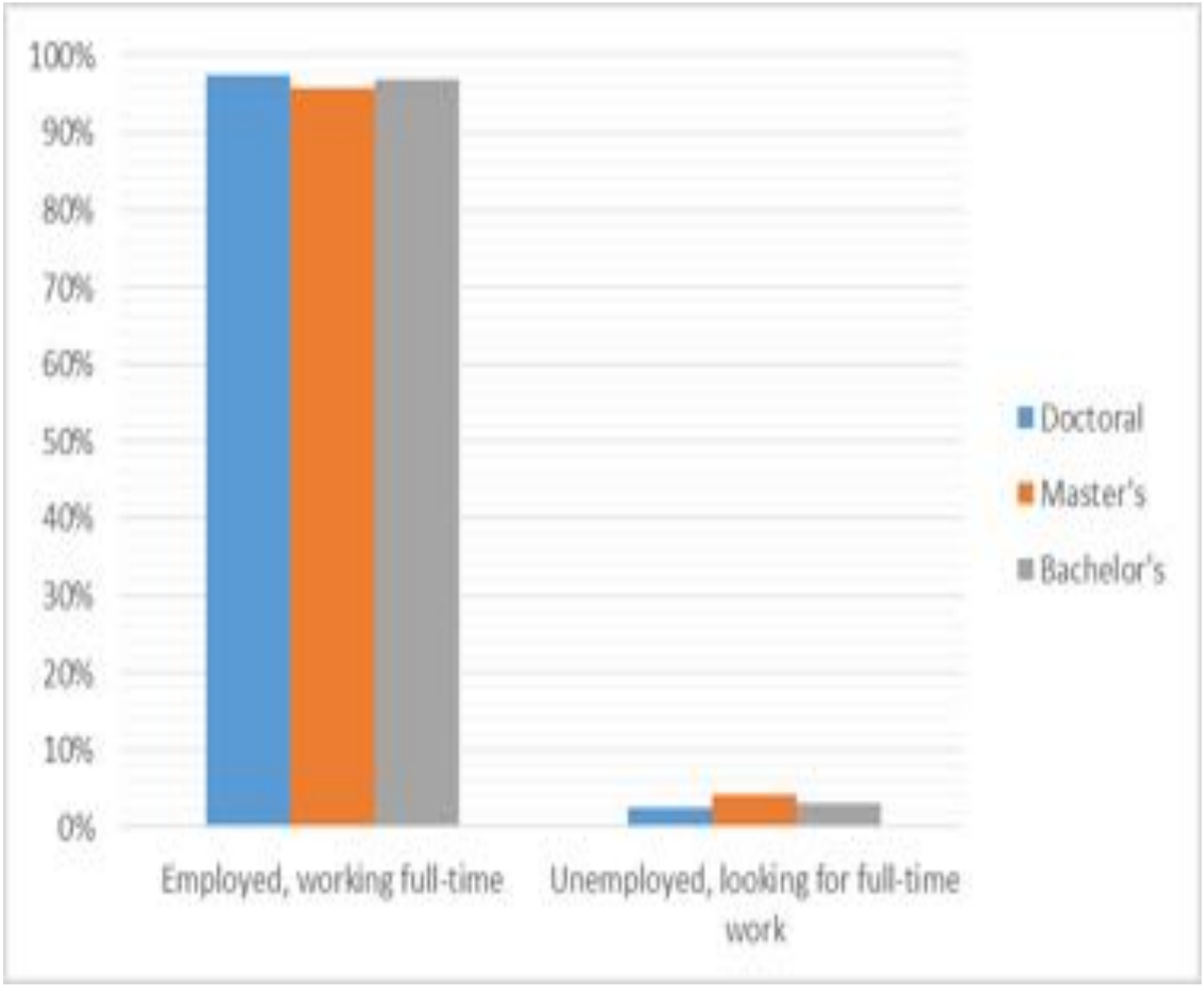
Figure 7: Main activity of HDR candidates the year before beginning a research degree, showing the large number of candidates entering HDR training with past work experience



Reproduced from Department of Innovation, Industry, Science and Research (2011a).

Employed, but doing what?



Source: ABS census data 2011

Most common occupations

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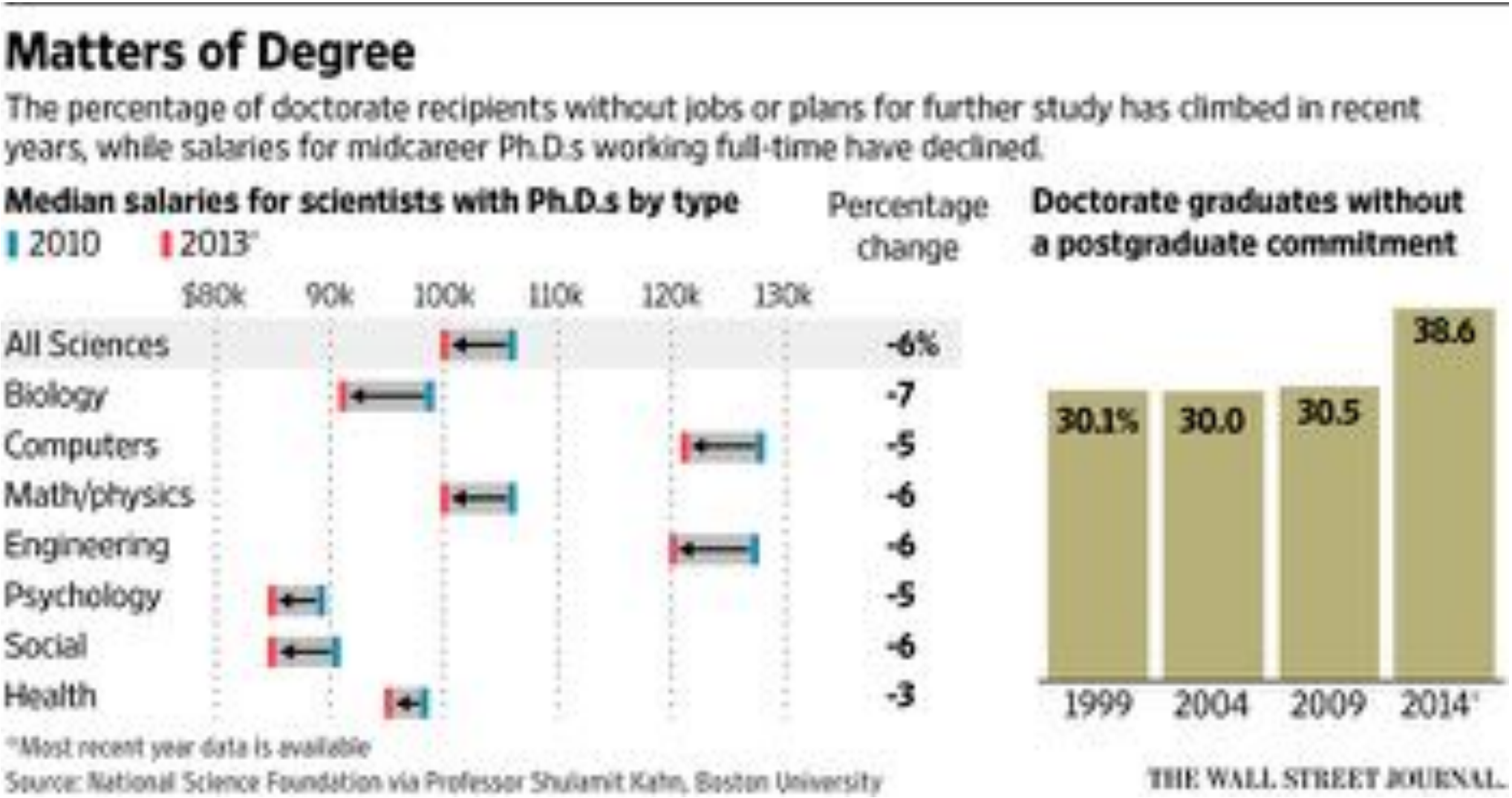
Table 12: Most common occupations among the doctorate population, Australia 2011

Occupation type (OCCP)	Number employed	Share of employed doctorate population (per cent)	Proportion of all employees in occupation who have a doctorate (per cent)
Tertiary Education Teachers	20,864	25.2	26.2
Natural and Physical Science Professionals	14,539	17.6	17.8
Professionals not further defined	5847	7.1	18.2
Social and Welfare Professionals	4334	5.2	4.5
Medical Practitioners	3486	4.2	5.0
Information and Organisation Professionals	3378	4.1	2.9
Engineering Professionals	2754	3.3	2.6
Business Administration Managers	2562	3.1	2.2
Chief Executives, General Managers and Legislators	1807	2.2	1.9
School Teachers	1743	2.1	0.5
Education, Health and Welfare Services Managers	1552	1.9	2.7
Business and Systems Analysts, and Programmers	1425	1.7	1.6
Miscellaneous Education Professionals	1078	1.3	2.0
Health Therapy Professionals	1019	1.2	1.8
Contract, Program and Project Administrators	906	1.1	0.9
Miscellaneous Specialist Managers	895	1.1	1.6
All other occupations	14,512	17.5	0.2
Total	82,701	100.0	0.8

Source: ABS Census data.



The PhD is not preparing graduates for jobs

Key findings

1. Universities have a duty of care to communicate the likely outcomes of HDR training prior to candidates commencing their training.
2. Develop new accessible entry pathways which better prepare candidates for HDR training.
3. Provide universities with the flexibility to use their allocation of HDR training funding to extend scholarships to 4 years, and where necessary provide scholarship top-ups.
4. Develop broader transferable skills in HDR training.
5. Have more university-industry collaboration in HDR training to be in top 25% of OECD.
6. Create industry placements for more HDR candidates.
7. Report on the effectiveness of HDR training.
8. Benchmark against international standards.
9. Develop an examination system that tests the candidate's skills and knowledge.
10. Ensure all supervision is at the highest standards and that supervisors are trained.
11. Develop targets and incentives to improve indigenous HDR outcomes.

The Carnegie Foundation

The Carnegie Foundation study of research training in the US (2002) argued that research training should produce "stewards of the discipline".

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- generating new knowledge

Conceptual Framework

- Training
- Education
- Formation


FORMATION
MÉTIER
UNIVERSITÉ
ÉTUDE
ALTERNANCE
DÉMARCHE
CHÔMEUR
POSTULER
INDUSTRIE
MOTIVATION
PROFESSION
DIPLÔME
TRAVAIL
JOB
DÉMARCHE
EMPLOI

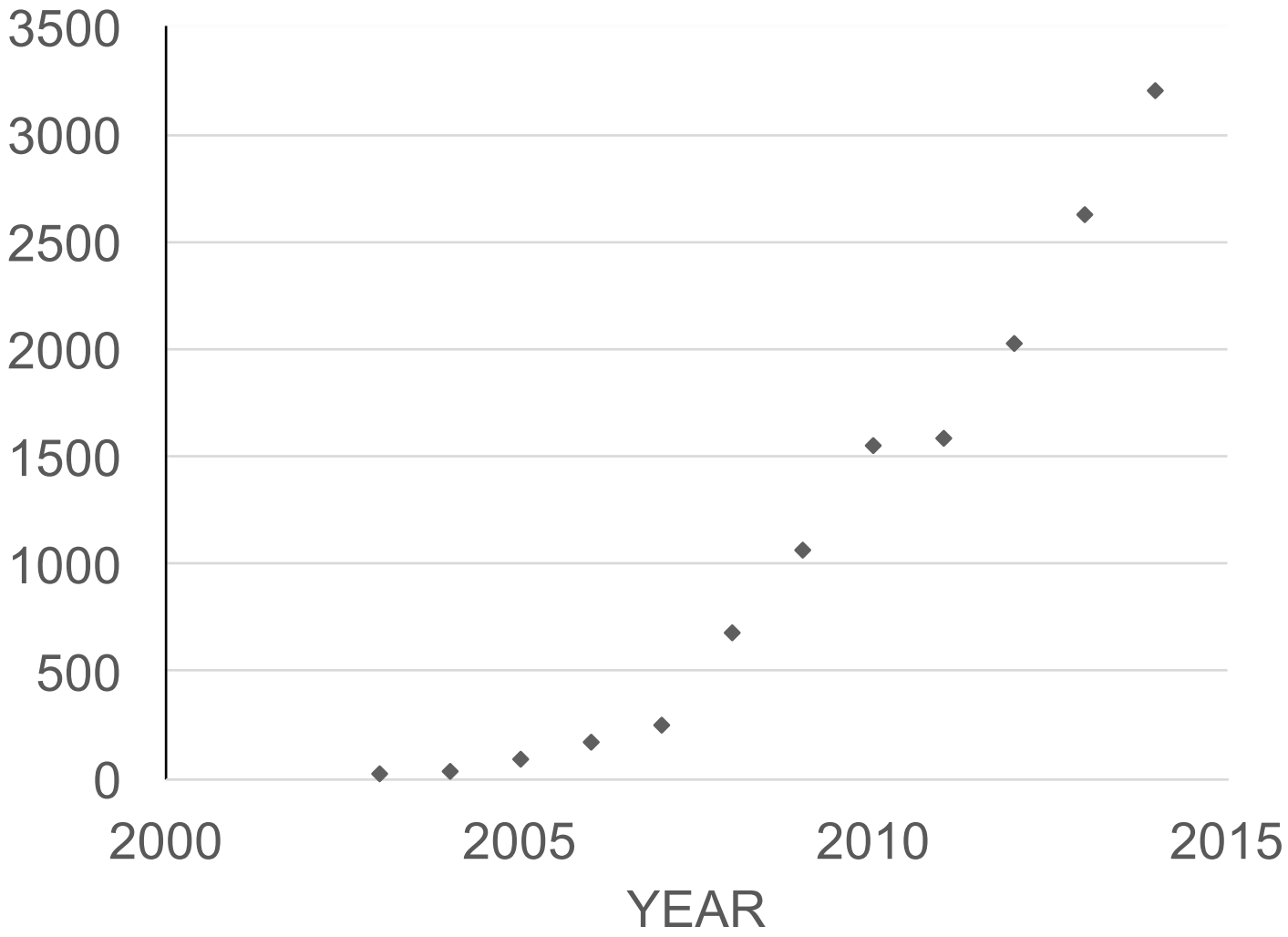
ACOLA Recommendation 4

- The Government should implement Recommendation 11 from the Review of Research Policies and Funding to develop a national Program to support industry placements for research doctoral candidates. The successful Canadian Mitacs program would be a useful template

- Coalition promise
  - $28.2 million evidence-based STEM internships investment ……will help the Australian Mathematical Sciences Institute expand its PhD internships to a national-scale programme, supported by industry, with a particular focus on women researchers.

- Started 1999 within Network Centre of Excellence Program
- Governed by Board 12 Directors: industry + university members + CEO/Scientific Director
- 14 government partners - Federal + most provincial governments
- 60+ university partners including 25 full, 15 Associate and 20+ honorary partners
- 2014 -15 collaborated with 1,065 Canadian industry partners + 23 outside Canada
- ~ 140 staff mostly at 20 major university campuses with 3 major 'hubs": Vancouver, Toronto, Montreal (external to university)
- Staff facilitate collaborations between university and industry and manage projects

Growth in MITACS interns



Standard build

- Grad student (MSc or PhD) and Postdocs
- Clearly defined project objectives
- 50/50 time commitment at both the industry and academic sites
  - Ensure active collaboration
- Multiple Internships
  - 2 max per Masters Student
  - 6 max per PhD Student
  - 6 max per Post-Doc

MITACS interns span disciplines (N=3194)

Engineering	36%
Life Sciences	21%
Computer Science	14%
Earth Sciences	10%
Mathematical/Physical Sciences	7%
Social Sciences/Humanities/Arts	6%
Business	6%

What does industry want?

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- Ability to create models

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- Ability to create models
- Ability to work together

Challenges

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- What industries are appropriate for internships?

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- Is there a difference between “training” and “formation” and if so, what?
- Will the postdoc become the “new” PhD and when will independence be obtained?

Thank you!