



Assoc. Prof. Jonathan Morris

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Reimagining the Science PhD

Australian Council of Deans of Science

National Research Forum

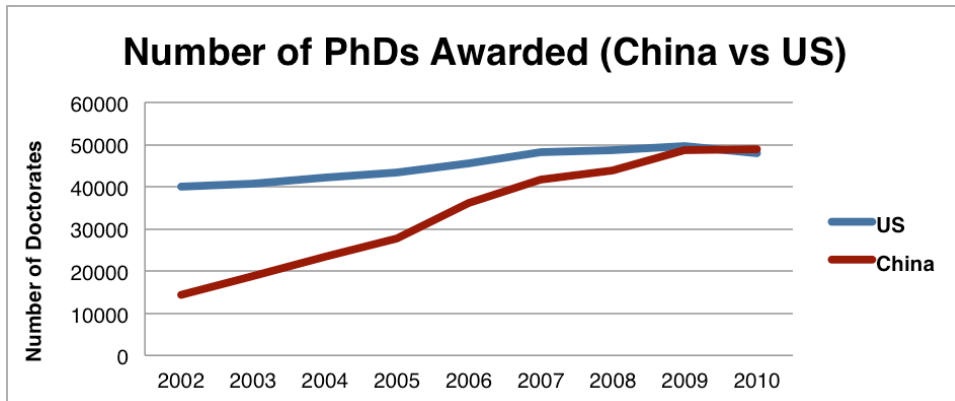
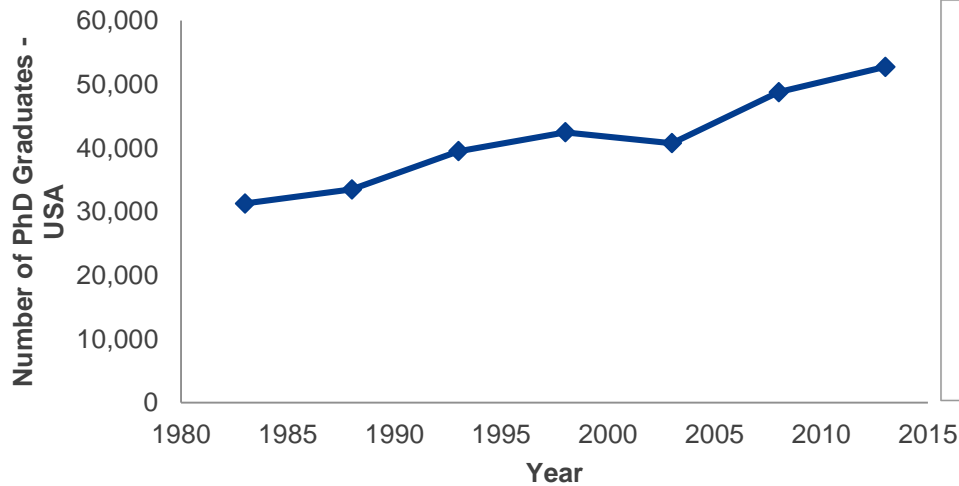
**Acknowledgments: Prof Laura Poole-Warren, Dean of Graduate
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Training, Engineering, UNSW**

The PhD

50 years ago largely prepared for the academy

Past 30 years numbers have ~doubled in USA and
~tripled over the past 10 years in China

Academic positions (USA) have remained flat



The Australian System

- first Research Doctorate candidate in 1948
- Australia now producing more than 8000 new Research Doctorate graduates each year, and just under 1500 Research Masters graduates
- In 2014, there were 11,894 commencing Research Doctorate candidates, compared with 8196 in 2003, and just 1838 in 1988, representing a six-fold increase over this time period

The current PhD model

PhD primarily an unstructured degree

Length restricted by funding pressures

Focus is on the core research

Main source of training is from supervisors only

Some value-added content available

- Not mandatory
- Not accredited
- Not structured or consolidated
- Not consistently accessed across programs/schools/faculties

The PhD



Research
Candidate



Institution



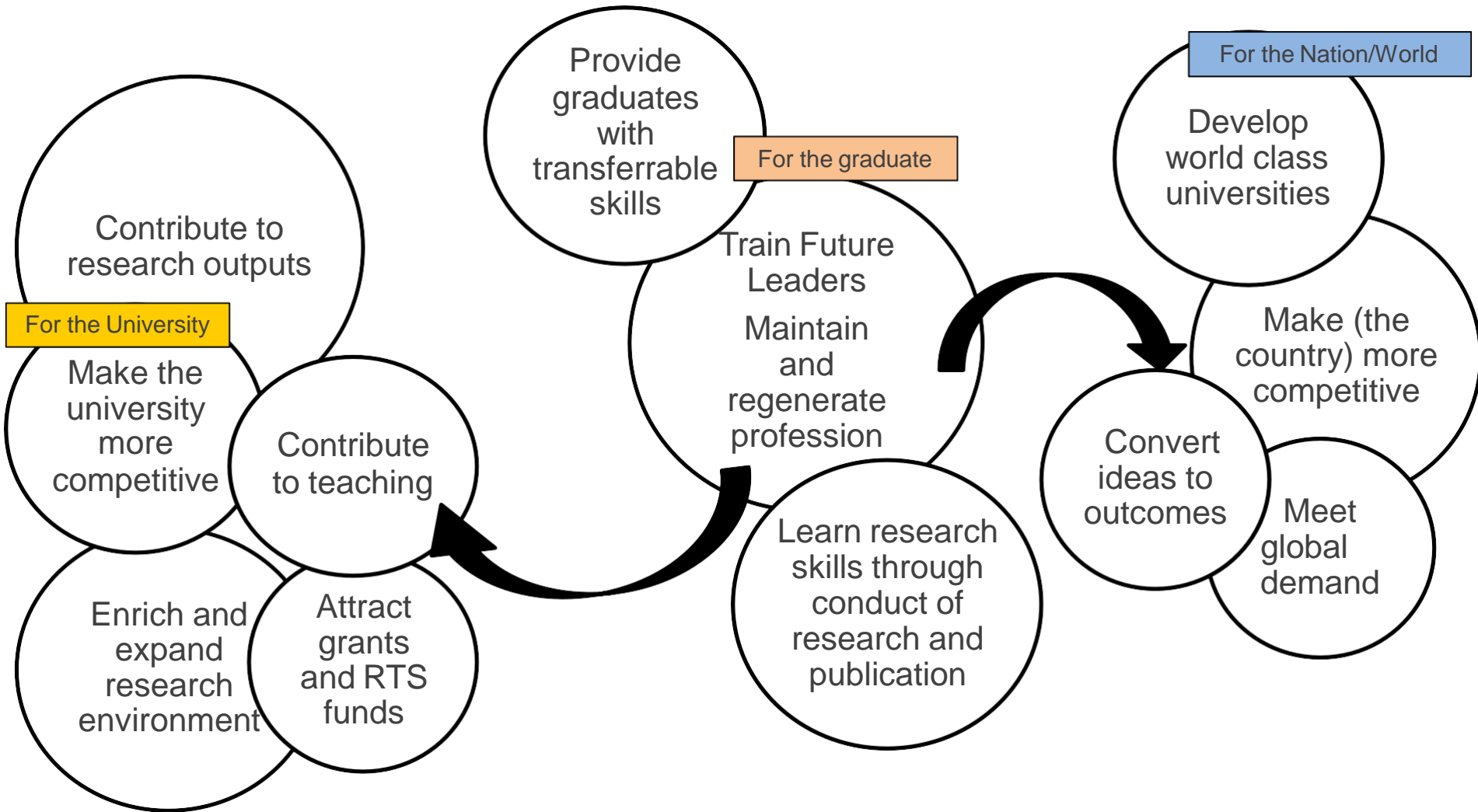
Nation



World

Why do we train PhDs?

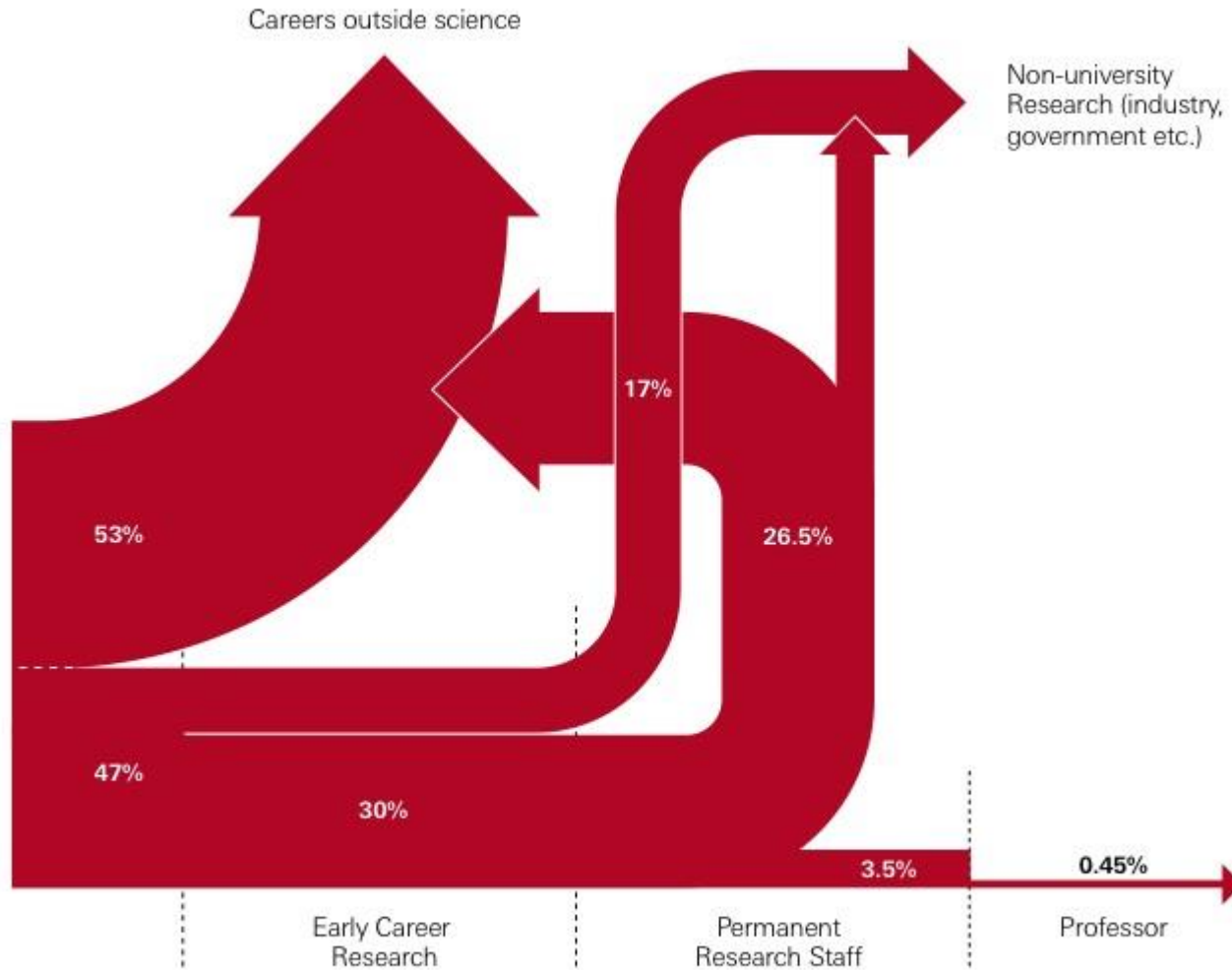
Why do we train PhDs?



Future Challenges

- Knowledge creation v skills development
 - Less than 50% of PhD graduates are employed in the academy 10 years after graduation
 - Increasing pressure from governments/employers for the PhD to integrate skills development
 - Is the current PhD supervision model the best way to support the competing interests of research excellence and career development?

Figure 1.6 **Careers in and outside science**



14 The Scientific Century: securing our future prosperity

Future Challenges

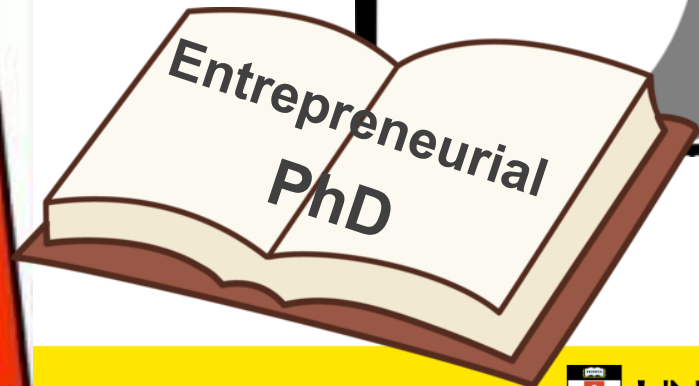
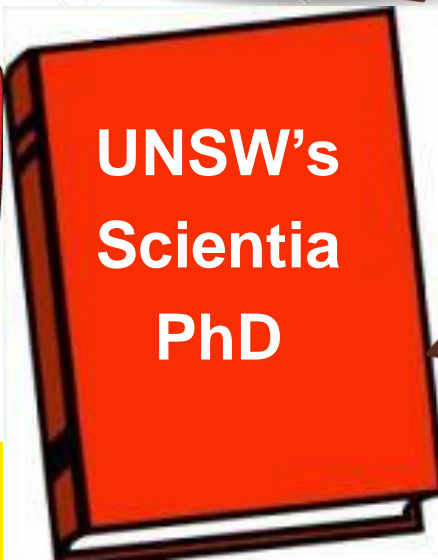
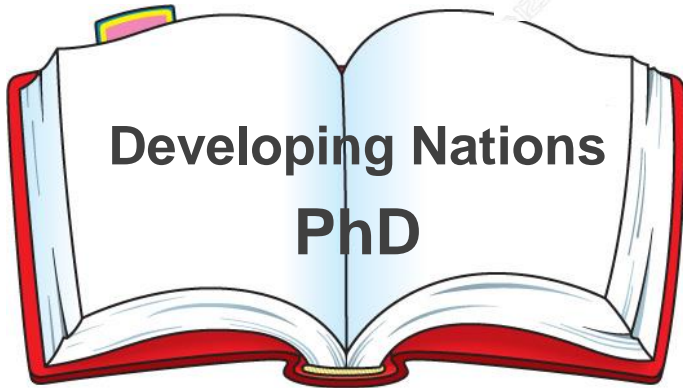
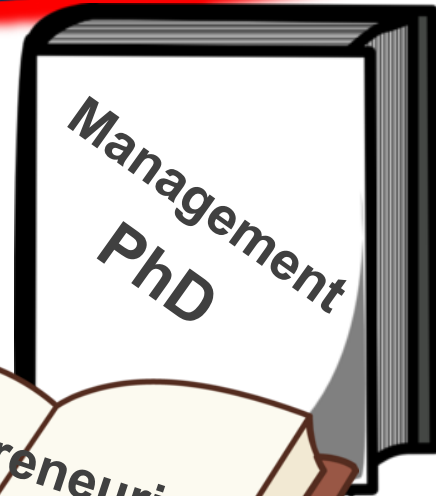
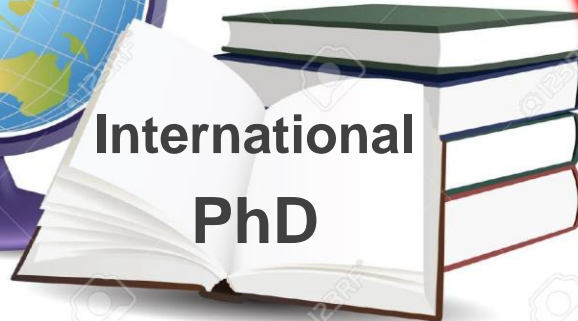
- Knowledge creation v skills development
 - Graduate expectations may be out of alignment with the supervisor expectations.

Specifically relating to development of:

- generic skills,
- teaching experience,
- industry experience and
- other non-research related skills

A New Style PhD

What if candidates could choose the kind of PhD they wanted???



Traditional PhD

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Future Options - The Structured PhD

- PhD is a structured degree
- Length is determined by added development
- Focus is on research + other skills
- Training & mentoring from supervisors + others
- Inclusion of value-add content

Academic PhD

For those who want to be an academic

- Standard length PhD
- Focus on excellent research
- Teaching component
- Supervision of UG or Masters students
- Development Plan
 - Learning and Teaching Skills
 - Supervision Skills
 - Grant Writing Skills
 - Project Management Skills

Joint PhD (or International PhD)

For the International Perspective

- Standard length PhD
- PhD jointly awarded from two universities
- Spends at least 1 yr in each university
- Focus on excellent research and collaboration

- *Potential Value Add*
 - Cultural Awareness training
 - Language development
 - International contextualisation of research area

Developing Nations PhD

For those from developing nations to create sustainable solutions that are culturally appropriate

- Longer timeframe
- Non-traditional entry requirements
- Placement back in home country during PhD
- Development Plan
 - English language training at the beginning & end
 - Cultural training upon arrival
 - Learning & Teaching skills
 - Supervision training

Science Management PhD

To learn management and consultancy skills

- Longer timeframe
- Placement with a management/consultancy company
- Different research focus
- Career Development Mentor
- Development Plan
 - MBA classes
 - Leadership training
 - Overseas placement??

Entrepreneurial PhD

To learn entrepreneurial skills

- Longer timeframe
- Placement with start up company
- Focus on project with potential commercial applications
- Career Development Mentor
- Development Plan
 - Entrepreneurial training
 - Start up business training
 - Commercialisation training

Industry Focused PhD


To gain experience in commercialisation and industry

- Longer timeframe
- Industry helps frame the research question
- Industry Mentor/Co-supervisor
- Placement within Industry for set time
- Development Plan
 - Innovation
 - Team skills
 - Project Management
 - Customer Engagement
 - etc

UNSW-CSIRO iPhD pilot program


The Program

CSIRO and UNSW are working with leading industry partners to develop the next generation of researchers with the skills to work at the interface of research and industry.



A four year program,
including a minimum six
month industry internship

\$40K per annum
scholarship



An elite industry-focused
research program

Three-way support system
by UNSW, CSIRO and an
Industry Partner



Candidates are matched
with an Industry Partner

Career and professional
development

Scientia PhD

UNSW's new type of PhD

Focus on Social Engagement or Global Impact

- Longer timeframe
- Increased Scholarship \$
- Support Package for Development & Collaboration
- Introduction Program
- Outstanding Supervision
- Mentoring & Career Development

The Structured PhD

Challenges

- How do we fund these new models?
- What do we assess at the end?
- How do we ensure consistency?
- How do we “instruct” our assessors?