Ballarat University

28 June 2013

Professor Aidan Byrne
CEO, Australian Research Council
Overview

- ARC
- Current landscape
  » Programs
  » ERA
  » Near to long-term issues
Detail of Government Investment in R&D 2012-13

- NHMRC: 9.3%
- ARC: 9.8%
- Industry R&D Tax Measures (estimated): 20.5%
- Block Funding to Higher Ed.: 21.3%
- Higher Ed R&D Support: 0.7%
- Other Business R&D Support: 0.2%
- Other Science Support: 4.8%
- CSIRO: 8.2%
- DSTO: 4.9%
- Govt R&D Activities: 6.7%
- Rural: 2.9%
- Energy and the Environment: 3.0%
- CRCs: 1.7%
- Other Health: 1.3%
- Other Innovation Support: 4.6%
Trends of Government Investment in R&D 2003-13 ($m)

(source: budget tables)
ARC funding awarded by program – last 5 years

- Discovery - Projects: 41%
- Linkage - Projects: 18%
- ARC Future Fellowships: 16%
- Centres of Excellence: 7%
- Australian Laureate/Fed Fellowships: 5%
- Linkage - Infrastructure Equipment and Facilities: 4%
- Special Research Initiatives: 4%
- Discovery Early Career Researcher Award: 3%
- Other: 2%
Average Grant Size - DP11 to DP13 - By 2 digit FOR showing awarded amount as part of requested amount

- Language, Communication and Culture
- Built Environment and Design
- Law and Legal Studies
- Studies in Creative Arts and Writing
- Philosophy and Religious Studies
- Education
- Human Society
- Economics
- Law and Legal Studies
- History and Archaeology
- Agriculture and Veterinary Sciences
- Medical and Health Sciences
- Mathematical Sciences
- Technology
- Earth Sciences
- Engineering
- Biological Sciences
- Environmental Sciences
- Physical Sciences
- Chemical Sciences

- not awarded
- awarded
Regional Universities Network – ARC funding

- Southern Cross University
- The University of New England
- University of Ballarat
- University of the Sunshine Coast
- University of Southern Queensland
- Central Queensland University
National Competitive Grants Program

**Discovery Projects**

- Laureate Fellowships
- Future Fellowships
- DECRA

**Linkage Projects**

- Centres of Excellence
- Co-Funded & SRI
- ITRP

Discovery Indigenous

5 year averages
The Industrial Transformation Research Program

Overall objectives:

- foster important partnerships between business and universities;
- support researchers (higher degree by research & post doctoral fellows) to gain ‘hands-on’, practical skills and experience in important priority areas.

Consists of two schemes:

Research Hubs

Training Centres
DP13 - Submission and success rate by gender and career age

- Male proportion
- Female proportion
- Male success rate
- Female success rate

Career Age:
- 0-5 Yrs
- 5-10 Yrs
- 10-15 Yrs
- 15-20 Yrs
- 20-25 Yrs
- 25 Yrs plus
ERA 2012

- A larger and more productive research sector than in 2010
  - research publications/outputs (up 24%)
  - researchers and related staff (up 9%)
  - patents (up 16%) and esteem measures (up 11%)
  - Competitive grant ($3.75 billion, up 18%) and other public sector income ($2.39 billion, up 25%)
Income and quality

HERDC income Cat 1-3 by rating - 2010

- Category 1
- Category 2
- Category 3
Income and quality

HERDC income Cat 1-3 by rating - 2012
ERA 2012 ARC/NHMRC research funding by discipline

$ Millions

ARC

NHMRC

2-digit group

01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22
ERA 2012 ARC/NHMRC research funding by rating

<table>
<thead>
<tr>
<th>ERA 2012 Rating (4-digit)</th>
<th>ARC</th>
<th>NHMRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>2</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>3</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>4</td>
<td>$1,400</td>
<td>$1,500</td>
</tr>
<tr>
<td>5</td>
<td>$1,600</td>
<td>$1,600</td>
</tr>
</tbody>
</table>
ERA 2012: Two Digit FoR codes

No. of Universities rated at world standard or higher

01 Mathematical Sciences
02 Physical Sciences
03 Chemical Sciences
04 Earth Sciences
05 Environmental Sciences
06 Biological Sciences
07 Agricultural and Veterinary Sciences
08 Information and Computing Sciences
09 Engineering
10 Technology
11 Medical and Health Sciences
12 Built Environment and Design
13 Education
14 Economics
15 Commerce, Management, Tourism and Services
16 Studies In Human Society
17 Psychology and Cognitive Sciences
18 Law and Legal Studies
19 Studies In Creative Arts and Writing
20 Language, Communication and Culture
21 History and Archaeology
22 Philosophy and Religious Studies

Legend:
- World standard
- Above world standard
- Well above world standard
ERA 2012: Two Digit FoR codes
Percentage of UoE rated at world standard or higher

01 Mathematical Sciences
02 Physical Sciences
03 Chemical Sciences
04 Earth Sciences
05 Environmental Sciences
06 Biological Sciences
07 Agricultural and Veterinary Sciences
08 Information and Computing Sciences
09 Engineering
10 Technology
11 Medical and Health Sciences
12 Built Environment and Design
13 Education
14 Economics
15 Commerce, Management, Tourism and Services
16 Studies In Human Society
17 Psychology and Cognitive Sciences
18 Law and Legal Studies
19 Studies In Creative Arts and Writing
20 Language, Communication and Culture
21 History and Archaeology
22 Philosophy and Religious Studies

- World standard
- Above world standard
- Well above world standard
Variation at Four-digit Level: STEM v HASS

Mathematical Studies (01) and Language, Communication and Culture (20)
Number of Universities Rated at World Standard or Higher

- 0101-Pure Mathematics - 2012
  - At World Standard: 6
  - Above World Standard: 6
  - Well Above World Standard: 2

- 0102-Applied Mathematics - 2012
  - At World Standard: 7
  - Above World Standard: 11
  - Well Above World Standard: 2

- 0103-Numerical and Computational Mathematics - 2012
  - At World Standard: 3
  - Above World Standard: 1
  - Well Above World Standard: 1

- 0104-Statistics - 2012
  - At World Standard: 2
  - Above World Standard: 6
  - Well Above World Standard: 1

- 0105-Mathematical Physics - 2012
  - At World Standard: 3
  - Above World Standard: 3
  - Well Above World Standard: 1

- 2001-Communication and Media Studies - 2012
  - At World Standard: 5
  - Above World Standard: 6
  - Well Above World Standard: 2

- 2002-Cultural Studies - 2012
  - At World Standard: 10
  - Above World Standard: 7
  - Well Above World Standard: 4

- 2003-Language Studies - 2012
  - At World Standard: 1
  - Above World Standard: 2
  - Well Above World Standard: 1

- 2004-Linguistics - 2012
  - At World Standard: 7
  - Above World Standard: 5
  - Well Above World Standard: 2

- 2005-Literary Studies - 2012
  - At World Standard: 9
  - Above World Standard: 3
  - Well Above World Standard: 5
ERA Outcomes by Cohort

Regional Universities Network

non-alliance

Innovative Research Universities Australia

Group of Eight

Australian Technology Network

[Legend: 1, 2, 3, 4, 5]
# Interdisciplinary activity

<table>
<thead>
<tr>
<th>Field</th>
<th>01</th>
<th>02</th>
<th>03</th>
<th>04</th>
<th>05</th>
<th>06</th>
<th>07</th>
<th>08</th>
<th>09</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematical Sciences</td>
<td>11.5</td>
<td>1.1</td>
<td>2.8</td>
<td>2.6</td>
<td>6.1</td>
<td>2.6</td>
<td>21.5</td>
<td>34.4</td>
<td>1.6</td>
<td>6.7</td>
<td></td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>10.5</td>
<td>22.8</td>
<td>3.9</td>
<td>0.0</td>
<td>1.6</td>
<td>0.1</td>
<td>1.0</td>
<td>47.6</td>
<td>8.9</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>Chemical Sciences</td>
<td>0.5</td>
<td>12.3</td>
<td>1.2</td>
<td>4.6</td>
<td>20.9</td>
<td>0.8</td>
<td>0.3</td>
<td>41.1</td>
<td>4.8</td>
<td>12.8</td>
<td></td>
</tr>
<tr>
<td>Earth Sciences</td>
<td>4.0</td>
<td>7.9</td>
<td>3.4</td>
<td>21.6</td>
<td>20.8</td>
<td>4.4</td>
<td>1.1</td>
<td>23.1</td>
<td>0.3</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Environmental Sciences</td>
<td>1.0</td>
<td>0.0</td>
<td>4.4</td>
<td>5.9</td>
<td>51.9</td>
<td>17.6</td>
<td>0.6</td>
<td>5.5</td>
<td>1.2</td>
<td>2.1</td>
<td></td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>0.9</td>
<td>0.3</td>
<td>7.9</td>
<td>2.6</td>
<td>22.5</td>
<td>14.3</td>
<td>1.9</td>
<td>1.6</td>
<td>1.8</td>
<td>44.3</td>
<td></td>
</tr>
<tr>
<td>Agricultural and Veterinary Sciences</td>
<td>1.4</td>
<td>0.0</td>
<td>1.2</td>
<td>2.0</td>
<td>24.2</td>
<td>47.6</td>
<td>0.9</td>
<td>6.3</td>
<td>3.1</td>
<td>8.5</td>
<td></td>
</tr>
<tr>
<td>Information and Computing Sciences</td>
<td>12.3</td>
<td>0.8</td>
<td>0.3</td>
<td>0.4</td>
<td>0.9</td>
<td>6.0</td>
<td>1.0</td>
<td>20.2</td>
<td>8.1</td>
<td>9.5</td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>9.3</td>
<td>15.2</td>
<td>22.6</td>
<td>4.4</td>
<td>3.7</td>
<td>2.5</td>
<td>3.0</td>
<td>10.8</td>
<td>15.2</td>
<td>7.2</td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td>1.8</td>
<td>7.6</td>
<td>9.3</td>
<td>0.2</td>
<td>2.3</td>
<td>9.6</td>
<td>4.8</td>
<td>12.1</td>
<td>42.7</td>
<td>6.8</td>
<td></td>
</tr>
<tr>
<td>Medical and Health Sciences</td>
<td>0.9</td>
<td>0.4</td>
<td>4.0</td>
<td>0.0</td>
<td>0.8</td>
<td>35.2</td>
<td>1.9</td>
<td>2.7</td>
<td>4.4</td>
<td>1.1</td>
<td></td>
</tr>
</tbody>
</table>

*20-29%* | *30-39%* | *> 40%*
# Interdisciplinary activity

<table>
<thead>
<tr>
<th></th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
<th>21</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Built Environment and Design</td>
<td></td>
<td></td>
<td></td>
<td>3.7</td>
<td>2.9</td>
<td>10.2</td>
<td>23.5</td>
<td>2.3</td>
<td>1.6</td>
<td>10.2</td>
<td>2.8</td>
</tr>
<tr>
<td>Education</td>
<td>1.7</td>
<td>0.3</td>
<td>8.8</td>
<td>15.4</td>
<td>13.6</td>
<td>2.2</td>
<td>10.1</td>
<td>11.2</td>
<td>1.4</td>
<td>3.8</td>
<td></td>
</tr>
<tr>
<td>Economics</td>
<td>3.5</td>
<td>0.9</td>
<td>31.8</td>
<td>21.7</td>
<td>1.0</td>
<td>3.2</td>
<td>0.0</td>
<td>0.8</td>
<td>0.2</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Commerce, Management, Tourism</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and Services</td>
<td>4.2</td>
<td>9.5</td>
<td>13.6</td>
<td>15.4</td>
<td>11.3</td>
<td>5.7</td>
<td>1.0</td>
<td>4.3</td>
<td>1.2</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>Studies in Human Society</td>
<td>6.8</td>
<td>9.2</td>
<td>5.0</td>
<td>8.6</td>
<td>5.6</td>
<td>10.5</td>
<td>2.2</td>
<td>12.0</td>
<td>7.2</td>
<td>7.3</td>
<td></td>
</tr>
<tr>
<td>Psychology and Cognitive</td>
<td>0.4</td>
<td>6.1</td>
<td>0.2</td>
<td>5.1</td>
<td>4.0</td>
<td>0.5</td>
<td>0.7</td>
<td>1.8</td>
<td>0.0</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Sciences</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Law and Legal Studies</td>
<td>2.6</td>
<td>6.6</td>
<td>2.2</td>
<td>13.8</td>
<td>41.6</td>
<td>2.7</td>
<td>0.4</td>
<td>6.7</td>
<td>3.5</td>
<td>10.1</td>
<td></td>
</tr>
<tr>
<td>Studies in Creative Arts and</td>
<td>8.3</td>
<td>17.6</td>
<td>0.0</td>
<td>1.5</td>
<td>6.1</td>
<td>2.7</td>
<td>0.3</td>
<td>47.0</td>
<td>5.9</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td>Writing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Language, Communication and</td>
<td>1.3</td>
<td>11.7</td>
<td>0.4</td>
<td>3.9</td>
<td>21.0</td>
<td>4.7</td>
<td>2.6</td>
<td>27.2</td>
<td>12.0</td>
<td>6.4</td>
<td></td>
</tr>
<tr>
<td>Culture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>History and Archaeology</td>
<td>3.9</td>
<td>2.7</td>
<td>0.3</td>
<td>3.2</td>
<td>25.5</td>
<td>0.2</td>
<td>3.3</td>
<td>6.8</td>
<td>24.3</td>
<td>17.4</td>
<td></td>
</tr>
<tr>
<td>Philosophy and Religious</td>
<td>0.4</td>
<td>8.0</td>
<td>1.2</td>
<td>6.4</td>
<td>24.9</td>
<td>6.7</td>
<td>7.0</td>
<td>3.4</td>
<td>12.2</td>
<td>19.0</td>
<td></td>
</tr>
<tr>
<td>Studies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

20-29%  | 30-39%  | > 40%
Patent/Relative Citation Impact by ERA 2012 Rating (4-digit)

High impact?

High impact and high quality?

High quality?
Research Commercialisation Income/Relative Citation Impact by ERA 2012 Rating (4-digit)

High impact?
High impact and high quality?
High quality?

Relative Citation Impact (1.0 = world average; Custom World Data from Elsevier Scopus)
Mapping Engagement:

Linkage Projects vs.
Discovery Projects

Linkage

Discovery

Strength in scheme
(if tot. $LP=$DP)

Total LP + DP $$

$450m

$200m

$50m

QLD

NSW

VIC

WA

NT

SA

TAS

ACT
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]
ERA as a measure of impact
ERA as a measure of impact

Can (and should) we measure impact as a separate quantity?
Departmental Discussion paper released 19 June – Seeking submissions by Friday 16 August 2013.

Assessing the wider benefits arising from university-based research: Discussion paper

June 2013
Discussion Paper

• Aims
  – Demonstrate the public benefits attributable to university-based research;
  – Identify the successful pathways to benefit;
  – Support the development of a culture and practices within universities that encourage and value research collaboration and engagement; and
  – Further develop the evidence base upon which to facilitate future engagement between the research sector and research users, as well as future policy and strategy.
Discussion Paper

• Outcomes

– Providing an evidence base for decision making by universities, government and industry, including universities and businesses outside Australia;

– Promoting engagement both between university researchers and potential users of university research, as well as within the university sector;

– Promoting the research outcomes and engagement strategies of Australia’s publicly funded universities both domestically and internationally;

– Providing an evidence base for benchmarking standards within the university sector; and

– Linking outcomes to funding allocations.
Discussion Paper

• **Principles**
  
  – Provide useful information to universities
  
  – Minimise administrative burden
  
  – Encourage research engagement and collaboration, and research that benefits the nation
  
  – Involve research users
  
  – Collect and assess at the institution level, with some granularity by discipline

• Departmental Discussion paper 19 June – seeking submissions by Friday 16 August 2013.
Where does the impact begin?

Academic activity $\rightarrow$ Impact

- Salaries
  - researchers
  - technicians

- Buy
  - equipment
  - books
  - ICT

- Papers

- Patents
  - New Government Policy
  - New Research Paradigm
  - Spin-off Company
Case 1:

Case 2:

Case 3:
Effect of measurement & feedback

- Salaries, researchers, technicians
- Buy, equipment, books, ICT
- Papers
- Patents
- New Government Policy
- New Research Paradigm
- Spin-off Company

IMPACT?
Universities are multi-dimensional

We need a better and more complete description of activity.
Leveraging the Benefits: Open Access

- Starting in January 2013, it is mandated by ARC funding rules that completed projects must make their publications available on an open access repository.
- Details: http://www.arc.gov.au/applicants/open_access.htm
- Questions remain –
  - How open is open?
  - Timeframes, ‘loopholes’, is it fast enough?
  - Green or Gold? Green and gold? Colourblind?

- An open future: Open Data and Open Innovation
Q&A session

- Making applications shorter, faster
- Factors affecting the success rate
- Health & medical research
- Defence Trade Control Bill
- International linkages (Asian White Paper)
- National Research Priority Areas
- Budgets & Politics >> timelines