How research is measured and what it means for your career

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Dr Douglas Robertson, Director Research Services
Aaron Ballagh, Research Data Manager
November 2015
How research is measured

Speakers:

• Dr Douglas Robertson, Director Research Services
• Aaron Ballagh, Research Data Manager

Learning outcomes:

1. Understand how research outputs are measured and how this might differ between universities

2. Have an appreciation for the complexities of the contemporary publishing landscape and the importance of being strategic about how and where you publish

3. Understand how publishing does - and doesn't - play a role in promotion and career advancement
How research is measured - Outline

- Publishing strategies in the modern era
- HERDC and ERA
- Institutional versus Individual research assessment
- Research assessment tools – Interactive session
- Wrap up and Discussion
Publishing Strategies in the modern era

- Recent paper in Nature
- Thomson Reuters Data set:
  - 58 m publications
  - 29 m cited only once or never
  - 58,000 paper cited more than 1000 times
- Ian Chubb – Australian model treats them as equal; Do universities?
How do you stand out?

• 17,000 papers on one protein if you read five papers a day it would take 35 years to read them
Publishing Strategies in the modern era

• New Journals and Open Access
  – "it is not where you publish but what you publish?"
  – Jeffrey Beall, a research librarian at the University of Colorado in Denver, has developed his own blacklist of what he calls “predatory open-access journals.” There were 20 publishers on his list in 2010, and now there are more than 690. He estimates that there are as many as 4,000 predatory journals today, at least 25 percent of the total number of open-access journals.

• [http://scholarlyoa.com/individual-journals/](http://scholarlyoa.com/individual-journals/)
Beale’s misleading metrics

- **Criteria for Determining Misleading Metrics**
  - The website for the metric is nontransparent and provides little information about itself such as location, management team and its experience, other company information, and the like.
  - The company charges journals for inclusion in the list.
  - The values (scores) for most or all of the journals on the list increase each year.
  - The company uses Google Scholar as its database for calculating metrics (Google Scholar does not screen for quality and indexes predatory journals).
  - The metric uses the term “impact factor” in its name.
  - The methodology for calculating the value is contrived, unscientific, or unoriginal.
  - The company exists solely for the purpose of earning money from questionable journals that use the gold open-access model. The company charges the journals and assigns them a value, and then the journals use the number to help increase article submissions and therefore revenue. Alternatively, the company exists as a front for an existing publisher and assigns values to that publisher’s journals.
Co-authorship and collaboration

– Study shows citations impact of research collaboration in STEM disciplines is higher for international collaboration than for national and regional collaboration (Frenken et al. 2010)
– Who are you publishing with?

What is your research question: The “So What” test…
HERDC and ERA

- Australian research publication collection and assessment exercises
- HERDC: Higher Education Research Data Collection
- ERA: Excellence in Research for Australia
- Used to allocate funding to Universities through the Research Block Grant Schemes
- HERDC: Annual collection of research publication quantity
- ERA: 2-3 yearly assessment to evaluate research quality
HERDC

- Research publication data submitted to the Department of Education and Training annually
- Used in determining universities annual Research Block Grant (RBG) allocations
- Purely quantity measure based on the number of authors on each publication
- Publications must contain original research, be peer reviewed and demonstrate author affiliation with the university

<table>
<thead>
<tr>
<th>Category</th>
<th>Publication Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Book</td>
</tr>
<tr>
<td>B1</td>
<td>Book Chapter</td>
</tr>
<tr>
<td>C1</td>
<td>Journal Article</td>
</tr>
<tr>
<td>E1</td>
<td>Conference Paper</td>
</tr>
</tbody>
</table>

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A faster scaling in acceleration-sensitive atom interferometers

G. D. McDonald\(^{(a)}\), C. C. N. Kuhn, S. Bennetts, J. E. Debs, K. S. Hardman, J. D. Close and N. P. Robbins

Quantum Sensors Lab, Department of Quantum Science, Research School of Physics and Engineering, Australian National University, Canberra, 0200, Australia\(^{(b)}\)
ERA

• Administered by the Australian Research Council
• Evaluates the quality of the research undertaken in Australian Universities against international benchmarks
• Discipline-specific research evaluation exercise
• Metrics used include citations metrics (STEM disciplines) and peer review (HASS disciplines)
• List of ERA-Eligible Journals
ERA

• **Fields of Research (FoR) Codes** - Australian and New Zealand Standard Research Classification (ANZSRC)

• The FoR codes assigned to publications will affect assessment of the research

<table>
<thead>
<tr>
<th>FoR Code</th>
<th>FoR Title</th>
<th>Assessment Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Mathematical Sciences</td>
<td>Citation Analysis/ Peer Review</td>
</tr>
<tr>
<td>02</td>
<td>Physical Sciences</td>
<td>Citation Analysis</td>
</tr>
<tr>
<td>03</td>
<td>Chemical Sciences</td>
<td>Citation Analysis</td>
</tr>
<tr>
<td>04</td>
<td>Earth Sciences</td>
<td>Citation Analysis</td>
</tr>
<tr>
<td>05</td>
<td>Environmental Sciences</td>
<td>Citation Analysis</td>
</tr>
<tr>
<td>06</td>
<td>Biological Sciences</td>
<td>Citation Analysis</td>
</tr>
<tr>
<td>07</td>
<td>Agriculture and Veterinary Sciences</td>
<td>Citation Analysis</td>
</tr>
<tr>
<td>08</td>
<td>Information and Computing Sciences</td>
<td>Peer Review</td>
</tr>
<tr>
<td>09</td>
<td>Engineering</td>
<td>Citation Analysis</td>
</tr>
<tr>
<td>10</td>
<td>Technology</td>
<td>Citation Analysis/ Peer Review</td>
</tr>
<tr>
<td>11</td>
<td>Medical and Health Sciences</td>
<td>Citation Analysis</td>
</tr>
<tr>
<td>12</td>
<td>Built Environment and Design</td>
<td>Peer Review</td>
</tr>
<tr>
<td>13</td>
<td>Education</td>
<td>Peer Review</td>
</tr>
<tr>
<td>14</td>
<td>Economics</td>
<td>Peer Review</td>
</tr>
<tr>
<td>15</td>
<td>Commerce, Management, Tourism and Services</td>
<td>Peer Review</td>
</tr>
<tr>
<td>16</td>
<td>Studies in Human Society</td>
<td>Peer Review</td>
</tr>
<tr>
<td>17</td>
<td>Psychology and Cognitive Sciences</td>
<td>Citation Analysis</td>
</tr>
<tr>
<td>18</td>
<td>Law and Legal Studies</td>
<td>Peer Review</td>
</tr>
<tr>
<td>19</td>
<td>Studies in Creative Arts and Writing</td>
<td>Peer Review</td>
</tr>
<tr>
<td>20</td>
<td>Language, Communication and Culture</td>
<td>Peer Review</td>
</tr>
<tr>
<td>21</td>
<td>History and Archaeology</td>
<td>Peer Review</td>
</tr>
<tr>
<td>22</td>
<td>Philosophy and Religious Studies</td>
<td>Peer Review</td>
</tr>
<tr>
<td>0906</td>
<td>Electrical and Electronic Engineering</td>
<td></td>
</tr>
<tr>
<td>090601</td>
<td>Circuits and Systems</td>
<td></td>
</tr>
<tr>
<td>090602</td>
<td>Control Systems, Robotics and Automation</td>
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</tr>
<tr>
<td>090603</td>
<td>Industrial Electronics</td>
<td></td>
</tr>
<tr>
<td>090604</td>
<td>Microelectronics and Integrated Circuits</td>
<td></td>
</tr>
<tr>
<td>090605</td>
<td>Photodetectors, Optical Sensors and Solar Cells</td>
<td></td>
</tr>
</tbody>
</table>
ERA

• Low discipline thresholds for assessment – quality not quantity

• Each evaluated FoR is given a rating:
  1. Well below world standard
  2. Below world standard
  3. At world standard
  4. Above world standard
  5. Well above world standard
  n/a. Not assessed

• ERA 2012 4-Digit FoR outcomes for ANU:
  • 27 FoRs rated 5
  • 28 FoRs rated 4
  • 7 FoRs rated 3
Institutional vs Individual Research Assessment

Institutional and external drivers of research and impacts on career

- Quality and Quantity as measures of academic excellence
- Discipline matters – where you benchmark your research
- Be strategic and set your career goal:
  - Academic at any cost?
  - Academic in a research intensive university?
- Academic performance review – general trends
  - Qualitative vs Quantitative approaches
- Academic Promotions
  - more than just publications at ANU
  - Strong emphasis on peer assessment
“I was an eight, too, until the number crunchers got hold of me.”
Q-Index
UPDATE 10 January 2015:

Overview
Q-index provides each UQ academic with an individual composite index of research and teaching performance over a rolling 6-year window plus the current year to date, e.g., 2005-2010 + 2011 year to date. Research data is drawn nightly from eSpace, Research Master, and SI-net; teaching data is updated at the end of each semester.

Each staff member can see details of how their individual index has been calculated based upon the best available data, as well as a comparison against an average of their peers.

Information on the methodology, the weightings and the normalisation as well as how to navigate around the Q-index system are provided in the help page.

For further information, please email the MIS Helpdesk at q-index@uq.edu.au
<table>
<thead>
<tr>
<th>Publication Type</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURE AND SCIENCE PAPERS</td>
<td>5 POINTS</td>
</tr>
<tr>
<td>IN ARTS AND HUMANITIES TR OR SOCIAL SCIENCES CITATION INDEX</td>
<td>4 POINTS</td>
</tr>
<tr>
<td>ARTS AND HUMANITIES OR SOCIAL SCIENCES AND SCIENCE CITATION INDEX</td>
<td>3 POINTS</td>
</tr>
<tr>
<td>IN SCIENCE CITATION INDEX</td>
<td>2 POINTS</td>
</tr>
<tr>
<td>JOURNAL PAPERS NOT INDEXED BY TR ISI AS PER UWA SCHEDULE</td>
<td>1 POINT MAXIMUM</td>
</tr>
<tr>
<td>ALL OTHER PUBLICATION TYPES AS PER UWA SCHEDULE</td>
<td>SEE SCHEDULE</td>
</tr>
<tr>
<td>GRANTS $5K TO $50K</td>
<td>1 POINT</td>
</tr>
<tr>
<td>GRANTS $50K TO $500K</td>
<td>2 POINTS</td>
</tr>
<tr>
<td>&gt;$500K</td>
<td>3 POINTS</td>
</tr>
<tr>
<td>CAT 1 E.G. ARC</td>
<td>POINTS BY 2</td>
</tr>
<tr>
<td>PHD COMPLETION</td>
<td>2 POINTS</td>
</tr>
<tr>
<td>MASTERS COMPLETION</td>
<td>1 POINT</td>
</tr>
</tbody>
</table>
Research Assessment Tools
Research Assessment Tools

• Major providers:
  – Elsevier  Thomson Reuters  and  Google

• Research Publication Indexing Databases:
  – Scopus/Science Direct
  – Web of Science/Web of Knowledge
  – Google Scholar

• Journal Assessment Tools:
  – Journal Citation Reports
  – SClmago
  – Scopus/Science Direct
  – Web of Science/Web of Knowledge
  – Google Scholar Metrics
Research Assessment Tools

• Research Performance Analytics
  – InCites
  – SciVal
  – ESI

• Individual Researcher Profiles
  – Scopus
  – Web of Science
  – Google Scholar
  – Researcher ID
  – ORCID
  – Research Gate
  – Academia.edu

My Research Dashboard (New)
Scopus, Web of Science and Google Scholar: A Comparison

- Differences in the coverage and indexing methodology
- Scopus and WoS are bibliographic databases – index publications directly from publishers
- Google Scholar uses automated harvesting and data matching to index publications
  - Only indexes data on publications that is freely available on the web (e.g. University Repositories)
# Scopus, Web of Science: A Comparison

## Scopus vs. Web of Science

<table>
<thead>
<tr>
<th>Features</th>
<th>Scopus</th>
<th>Web of Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of journals</td>
<td>18,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Focus</td>
<td>Physical sciences, health sciences, life sciences, social sciences</td>
<td>Science, technology, social sciences, arts and humanities</td>
</tr>
<tr>
<td>Period covered</td>
<td>1966-</td>
<td>1900-</td>
</tr>
<tr>
<td>Databases covered</td>
<td>100% Medline, Embase and more</td>
<td>Science Citation, Social Sciences Citation, Arts &amp; Humanities Citation Indexes</td>
</tr>
<tr>
<td>Updated</td>
<td>daily</td>
<td>weekly?</td>
</tr>
<tr>
<td>Developer/Producer</td>
<td>Elsevier</td>
<td>Thomson Reuters</td>
</tr>
<tr>
<td>Citation analysis</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Controlled vocabulary</td>
<td>yes - IndexTerms field</td>
<td>no</td>
</tr>
<tr>
<td>Export feature</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Alerts service</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Strengths</td>
<td>• more versatile search tool with advantages in functionality (default, refine, format of results of citation tracker and author identification.</td>
<td>• greater time period of coverage</td>
</tr>
<tr>
<td></td>
<td>• covers 5255 unique journals, compared to WOS’ 1467</td>
<td>• more options for citation analysis for institutions</td>
</tr>
<tr>
<td></td>
<td>• greater international coverage</td>
<td>• covers science and arts/humanities</td>
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<tr>
<td></td>
<td>• can use “first author” as a search field in Advanced Search</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• can search with controlled vocabulary</td>
<td></td>
</tr>
<tr>
<td>Weaknesses</td>
<td>Social science coverage, esp. sociology and prior to 1966</td>
<td>No controlled vocabulary</td>
</tr>
</tbody>
</table>

Differences in the coverage and indexing methodology mean the citations rates also differ
- Discipline dependent

**H-Index**
- Provides a measure of both productivity and citation impact
- Based on the researcher’s most cited papers and the number of citations that they have received
- The most common metric used by researchers
- Differs significantly between providers
Major Providers: Web of Science, Scopus and Google Scholar

- Web of Science: [http://webofscience.com](http://webofscience.com)
Tools for assessing Journals

- Journal Citation Report (JCR): [https://jcr.incites.thomsonreuters.com/](https://jcr.incites.thomsonreuters.com/)
Research Performance Analytics

- **InCites**: [https://incites.thomsonreuters.com](https://incites.thomsonreuters.com)
- **Essential Science Indicators**: [https://esi.incites.thomsonreuters.com](https://esi.incites.thomsonreuters.com)

Examples:
- ANU is ranked 2 in Australia in Category Normalised Citation Impact in the field of **Astronomy and Astrophysics** (Source: InCites, pub years 2010 – 2014)
- ANU is ranked 3 in Australia in Category Normalised Citation Impact in the field of **Evolutionary Biology** (Source: InCites, pub years 2010 – 2014)
Altmetrics

- Altmetric web address: https://www.altmetric.com/
- Example: Wheeler's delayed-choice gedanken experiment with a single atom
Researcher Profiles

- Allows researchers to link all their publications to their profile
- Allows international identifiers to be created for researchers – easy identification when changing institutions
- Some profile systems (e.g. ORCID) allow for linking grants and other research outputs such as patents and datasets
Wrap Up

• **Questions to ask yourself:**
  - Should I publish in this conference?
  - Does the journal have:
    - A good online presence?
    - Is it indexed by Scopus or Web of Science?
    - Is it Peer Reviewed?

• **Discussion**