Research and researcher evaluation

Stephen Curry
Imperial College
Let me introduce myself...

Stephen Curry
Dept of Life Sciences
Professor of Structural Biology
Director of Undergraduate Studies

Science blogger/writer
Vice-chair, Science is Vital
Board member, CaSE
Member, HEFCE Metrics Review

http://www.theguardian.com/profile/stephen-curry
It's too hard I just want a first.
God
@TheTweetOfGod

Stephen Curry is a Me.

24/04/2015 05:19

1,679 RETWEETS 1,567 FAVORITES

Anna Ziegler’s new play, starring Nicole Kidman as scientist Rosalind Franklin, is a sophisticated and rewarding treatment of the impact of the human frailties on the process of scientific discovery.

Here is a hard problem: how to write a play about science that captures the real complexities of research while remaining accessible - and dramatic? I’m not sure that scientists like myself are best placed to investigate because such plays are not written for the likes of us. Being too deeply immersed in the world of the laboratory, we know too much and cannot see ourselves with the clarity required to make the audience care.
Research and researcher evaluation

Stephen Curry
Imperial College
Research researchers value
Research

researchers

value

values
Is that what people mean by ‘open access’?
Why do people become researchers?

- To understand the world
- To change the world
- To be remembered

“Christopher Lee—now there's a guy who knew how to be immortal.”
The digital world and the myth of measurement
The digital world and the myth of measurement
Measurement has its uses...
...but where are the limits?

The *Times Higher Education* World University Rankings

**World University Rankings 2013-2014**

<table>
<thead>
<tr>
<th>Rank</th>
<th>University</th>
<th>Country</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>California Institute of Technology (Caltech)</td>
<td>United States</td>
<td>94.9</td>
</tr>
<tr>
<td>2</td>
<td>Harvard University</td>
<td>United States</td>
<td>93.9</td>
</tr>
<tr>
<td>2</td>
<td>University of Oxford</td>
<td>United Kingdom</td>
<td>93.9</td>
</tr>
<tr>
<td>4</td>
<td>Stanford University</td>
<td>United States</td>
<td>93.8</td>
</tr>
<tr>
<td>5</td>
<td>Massachusetts Institute of Technology (MIT)</td>
<td>United States</td>
<td>93.0</td>
</tr>
<tr>
<td>6</td>
<td>Princeton University</td>
<td>United States</td>
<td>92.7</td>
</tr>
<tr>
<td>7</td>
<td>University of Cambridge</td>
<td>United Kingdom</td>
<td>92.3</td>
</tr>
<tr>
<td>8</td>
<td>University of California, Berkeley</td>
<td>United States</td>
<td>89.8</td>
</tr>
<tr>
<td>9</td>
<td>University of Chicago</td>
<td>United States</td>
<td>87.8</td>
</tr>
<tr>
<td>10</td>
<td>Imperial College London</td>
<td>United Kingdom</td>
<td>87.5</td>
</tr>
<tr>
<td>11</td>
<td>Yale University</td>
<td>United States</td>
<td>87.4</td>
</tr>
</tbody>
</table>
Knowing

What happens when the numbers take over?
The Metric Tide

Report of the Independent Review of the Role of Metrics in Research Assessment and Management

July 2015
“I have asked HEFCE to undertake a review of the role of metrics in research assessment and management. The review will consider the robustness of metrics across different disciplines and assess their potential contribution to the development of research excellence and impact…”

David Willetts, Minister for Universities & Science

April 2014
Who?

Chair: James Wilsdon, Professor of Science and Democracy, University of Sussex.

Independent steering group:

Dr Liz Allen (Head of Evaluation, Wellcome Trust)
Dr Eleonora Belfiore (Associate Professor of Cultural Policy, University of Warwick)
Sir Philip Campbell (Editor-in-Chief, Nature)
Professor Stephen Curry (Department of Life Sciences, Imperial College London)
Dr Steven Hill (Head of Research Policy, HEFCE)
Professor Richard Jones FRS – representing the Royal Society
Professor Roger Kain FBA – representing the British Academy
Dr Simon Kerridge (Director of Research Services, University of Kent)
Professor Mike Thelwall (Statistical Cybermetrics Research Group, University of Wolverhampton)
Jane Tinkler (LSE; Parliamentary Office of Science & Technology)
Dr Ian Viney (Head of Evaluation, Medical Research Council) – representing RCUK
Professor Paul Wouters (Centre for Science & Technology Studies, Uni of Leiden)
How?

- Broad terms of reference: opening up questions
- Transparent process: publishing minutes & evidence in real time
- Open call for evidence
  - 153 responses
- Stakeholder engagement: meetings and workshops (invited fiercest critics)
- In-depth literature review
- Quantitative correlation exercise relating REF outcomes to indicators of research

http://www.hefce.ac.uk/pubs/rereports/Year/2015/metictide/Title,104463,en.html
Main conclusions

- Responsible metrics
- Mind your language: indicators, not metrics
- Metrics inform but do not replace judgement
- Institutions need to be transparent about use
  - Clear statement of principles for assessment
  - Do not delegate measures of excellence to league tables or journals
  - Dialogue with staff
- Data needs to be transparent (challenge to providers)
- Building on DORA/Leiden Manifesto
Re-thinking: what is good research?

- Transformative understanding
  - Structure of DNA, RNAi, Higgs boson

- Transformative methods
  - X-ray crystallography, PCR, CRISPR

- Transformative technology
  - Silicon chip, graphene

- Transformative impact
  - Policy, behaviour, legislation
How do we “measure” good research?

• Publication in a high impact factor journal
• Citation counts
• H-index
• Expert evaluation
Present culture sustains traditional publishing

• Benefits
  • High bar to entry into ‘top’ journals spurs competition

• Downsides
  • High bar to entry slows publication
  • Reduces researcher productivity
  • Conservative peer review
  • Eye-catching research trumps quality?
  • IF-based rewards foster cheating
  • Cheating undermines public trust
  • Restricts access
  • Poor fit to public policy in the digital age
Re-imagining scientific publication in the open era

- Universal preprints (like arXiv)
  - Rapid dissemination
  - Constructive/collaborative criticism
  - Commenter credit

- Open Access Mega-Journals
  - Open, PLOS-style peer review: original & competent research
  - Confirmatory studies or negative results also encouraged
  - Reviewer credit
  - Competition on service and price: value for money
  - Universal access: more readers - more scrutiny

- Accessible Data/Software
  - Re-use and re-analysis
  - Disincentive to fraud
Downsides and challenges

• Quality concerns of pay-to-publish model?
  • Bohannon, Beall, and vanity publishing? Mitigated by openness

• Delegation of quality control to the reader: mistakes only detected after publication?
  • Risky for medical research?

• **BIG question:** How do we get the incentives right?
  • Post-publication reward mechanisms that are journal-independent
    • Use of preprints focuses attention on the content not the wrapper
    • Funders/institutions could reward speed, openness
  • Evaluate academics on **all** that they do (research+; see DORA)
  • Expose academics to price: funders need to get tough
    • Academic freedom vs Academic responsibility
  • De-throne the impact factor: **publish citation distributions**
JIFs mask huge variation in citation performance

Data for Nature Materials, 2010

Mode = 7
Impact factor = 29.897

Distribution highly skewed:
Highest cited 15% of papers account for 50% of citations
Two-thirds of papers perform less well than the JIF

Range (>2 orders of magnitude)
Correlation between JIF and citation rate of articles from individual scientists is often poor

“...authors do not necessarily publish their most citable work in journals of the highest impact, nor do their articles necessarily match the impact of the journals they appear in.”

A challenge to publishers

• Publish annual citation distributions (alongside JIF)

• Already committed: EMBO J, Peer J

• Under discussion elsewhere

• Who’s next?

Sometimes a small nudge leads to a big payoff…
Downsides and challenges

• Do we need selective journals to foster high-quality research?

• Do we need journals to foster disciplines & sub-disciplines?
“The work is complicated - why we do it is not.”

Jennifer Hansen
Gates Foundation