The 'end of the expert': why science needs to be above criticism

Towards cultural change in data management - data stewardship in practice
TU Delft
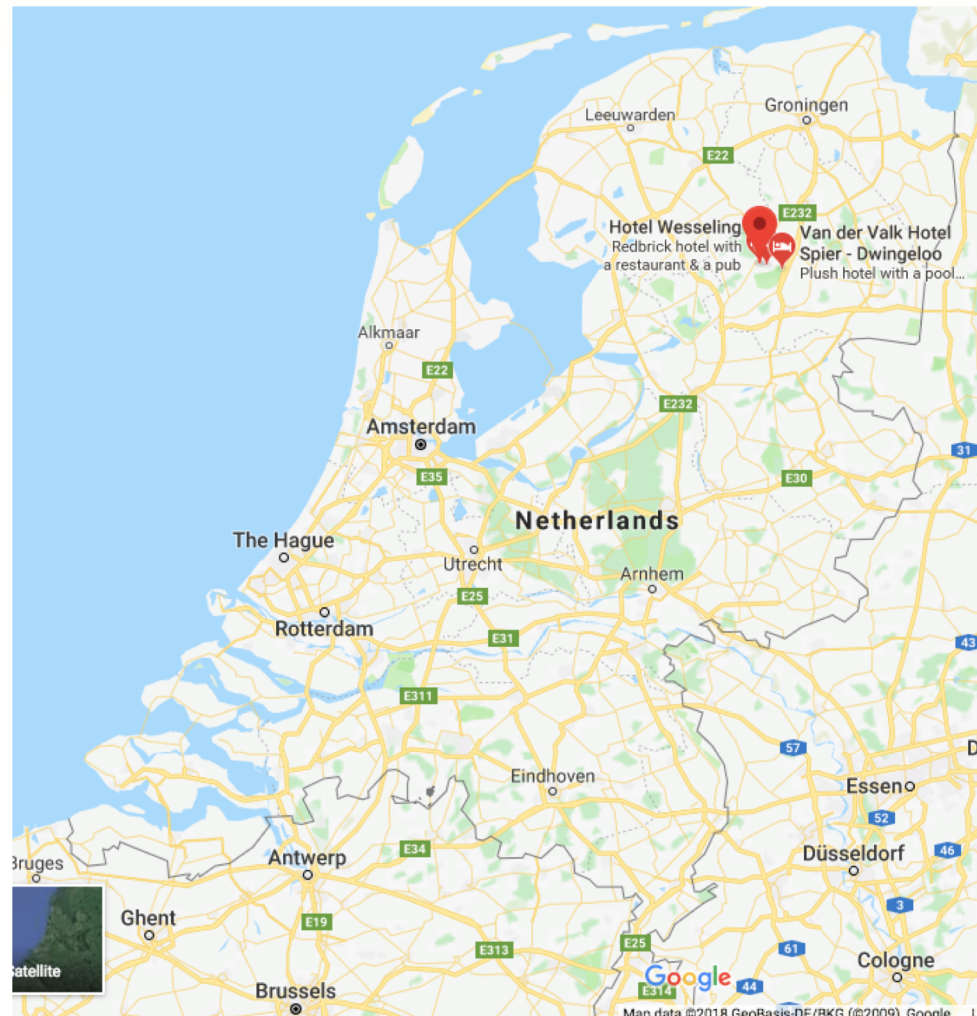
24 May 2018

Dr Danny Kingsley
Office of Scholarly Communication
Cambridge University
@dannykay68

These slides are available:

On a personal note

- In 1976 I spent six months living in Dwingeloo

Coming up:

- The credibility of science is under threat – we are living in a 'post truth' world

- Reproducibility issues are gaining considerable attention

- Open Science offers a solution

- The challenges of implementing Open Science

- Institutional moves towards Open Science

Normative Structure of Science

Robert K Merton, "The Normative Structure of Science", 1942 essay in The Sociology of Science edited by Norman W Storer, published 1973
http://www.collier.sts.vt.edu/5424/pdfs/merton_1973.pdf

This was 77 years ago

- "Incipient and actual attacks upon the integrity of science have led scientists to recognize their dependence on particular types of social structure. Manifestos and pronouncements by associations of scientists are devoted to the relations of science and society. An institution under attack must re-examine its foundations, restate its objectives, seek out its rationale. Crisis invites self-appraisal. Now that they have been confronted with challenges to their way of life, scientists have been jarred into a state of acute self-consciousness: consciousness of self as an integral element of society with corresponding obligations and interests."

During the Brexit discussion

Britain has had enough of experts, says Gove

Brexit campaigner offers to have disputed EU contribution figure audited

EU: In or Out?
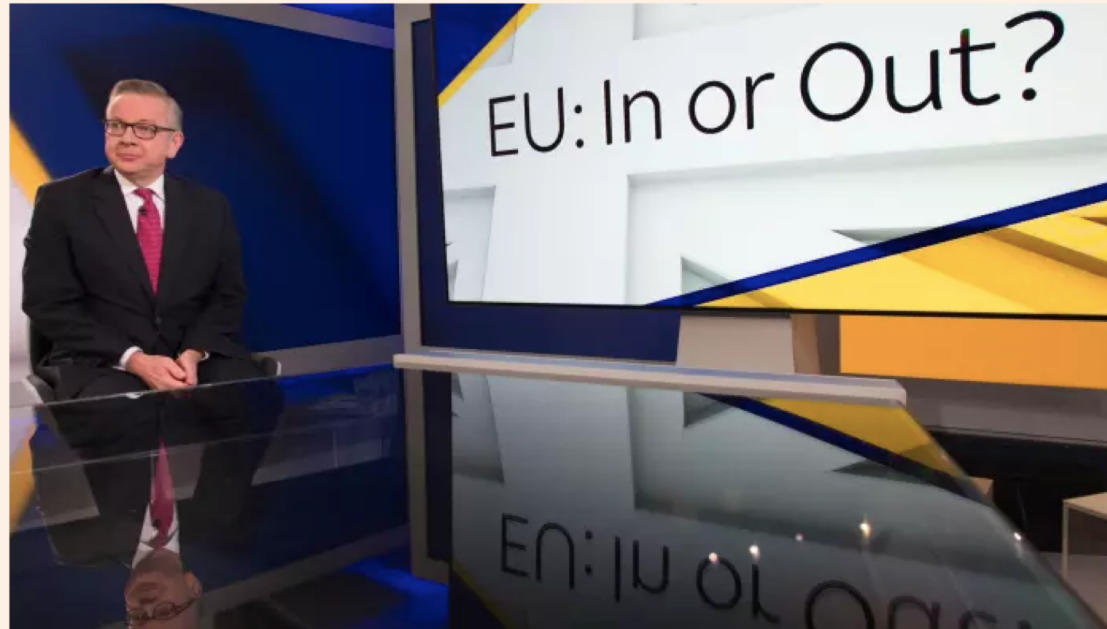
Justice Secretary Michael Gove takes part in a live Sky News Q&A on Brexit © PA

Henry Mance, Political correspondent JUNE 3, 2016   625

https://www.ft.com/content/3be49734-29cb-11e6-83e4-abc22d5d108c

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Who is the expert?

OP-ED CONTRIBUTORS

Scott Pruitt's Attack on Science Would Paralyze the E.P.A.

By Gina McCarthy and Janet G. McCabe

March 26, 2018

Scott Pruitt, administrator of the Environmental Protection Agency, has announced that he will bar the use of some scientific studies. Tom Brenner/The New York Times

"Scott Pruitt, the administrator of the Environmental Protection Agency, has announced that he alone will decide what is and isn't acceptable science for the agency to use when developing policies that affect your health and the environment."

Mr Pruitt is a lawyer.

https://www.nytimes.com/2018/03/26/opinion/pruitt-attack-science-epa.html

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The credibility of science is under threat

- "Speaking as a scientist, cherrypicking evidence is unacceptable," Hawking said. "When public figures abuse scientific argument, citing some studies but suppressing others, to justify policies that they want to implement for other reasons, it debases scientific culture."

- https://www.theguardian.com/science/2018/mar/14/i-would-not-have-survived-nhs-enabled-stephen-hawking-to-live-long-life

This is our new reality

We have to be above criticism

- "Incipient and actual attacks upon the integrity of science have led scientists to recognize their dependence on particular types of social structure. Manifestos and pronouncements by associations of scientists are devoted to the relations of science and society. An institution under attack must re-examine its foundations, restate its objectives, seek out its rationale. Crisis invites self-appraisal. Now that they have been confronted with challenges to their way of life, scientists have been jarred into a state of acute self-consciousness: consciousness of self as an integral element of society with corresponding obligations and interests."

Reproducibility

If studies cannot be replicated then this brings the whole credibility of the scientific endeavour into question.

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Oh dear

"Simulations show that for most study designs and settings, it is more likely for a research claim to be false than true."

http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0020124
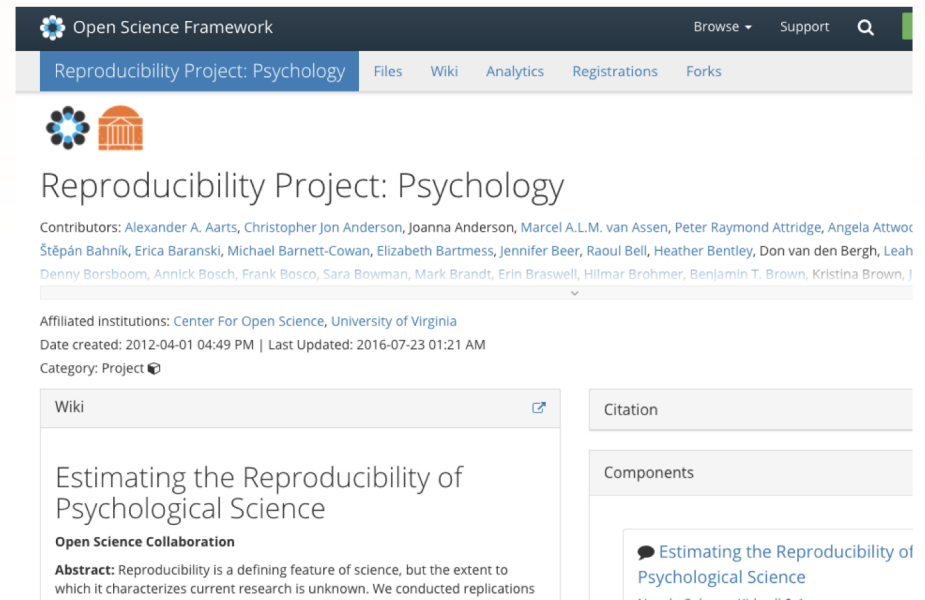
Reproducibility project

Conducted replications of 100 experimental and correlational studies published in three psychology journals using high-powered designs and original materials when available.

- Replication effects = half the magnitude of original effects (substantial decline)
- 97% of original studies had significant results
- 36% of replications had significant results

https://osf.io/ezcuj/

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How did we get here?

The only thing that counts in academia is publication of novel results in high impact journals
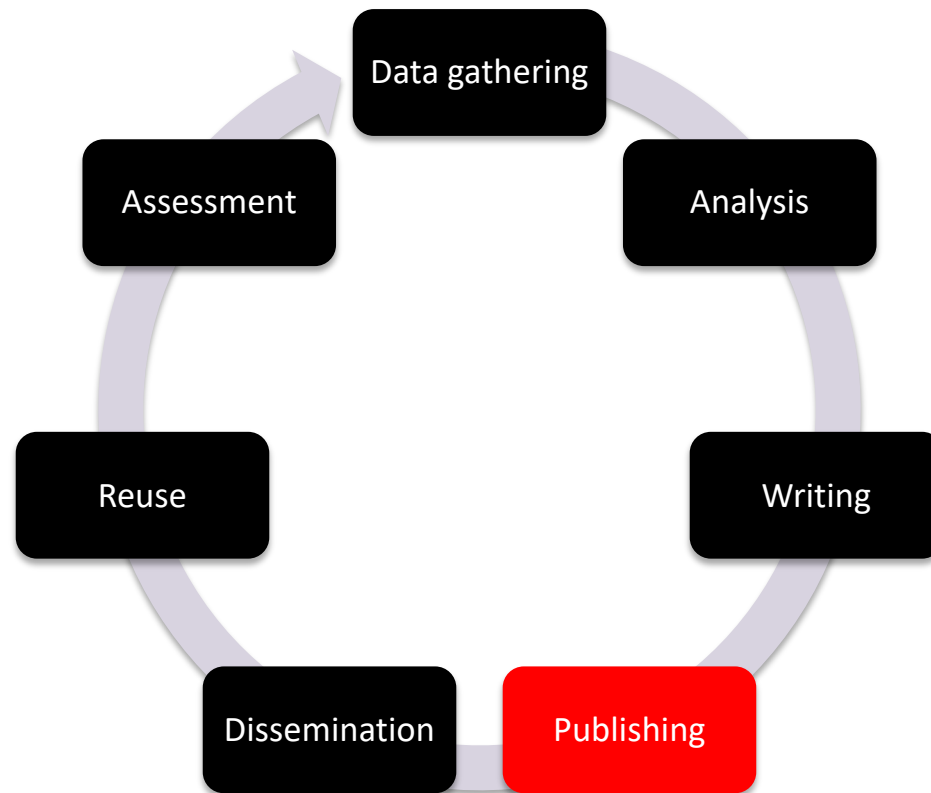
UK Government Science & Technology Committee

- ## UK Research Integrity Enquiry

  - "looks at trends and developments in fraud, misconduct and mistakes in research and the publication of research results."

  - Oral Evidence session 6 March 2018

    https://www.parliament.uk/business/committees/committees-a-z/commons-select/science-and-technology-committee/inquiries/parliament-2017/research-integrity-17-19/

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Early days in US

- Committee on Reproducibility and Replicability in Science with the National Academies of Science

- First meeting Dec 2017 – meetings each second month.

http://sites.nationalacademies.org/dbasse/bbcss/reproducibility_and_replicability_in_science/index.htm
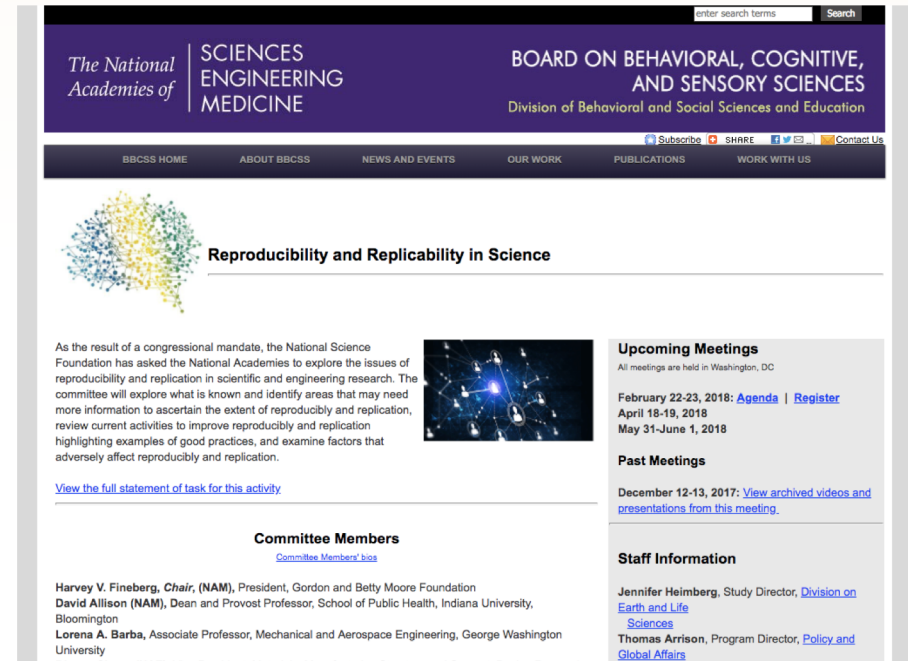
Crisis?
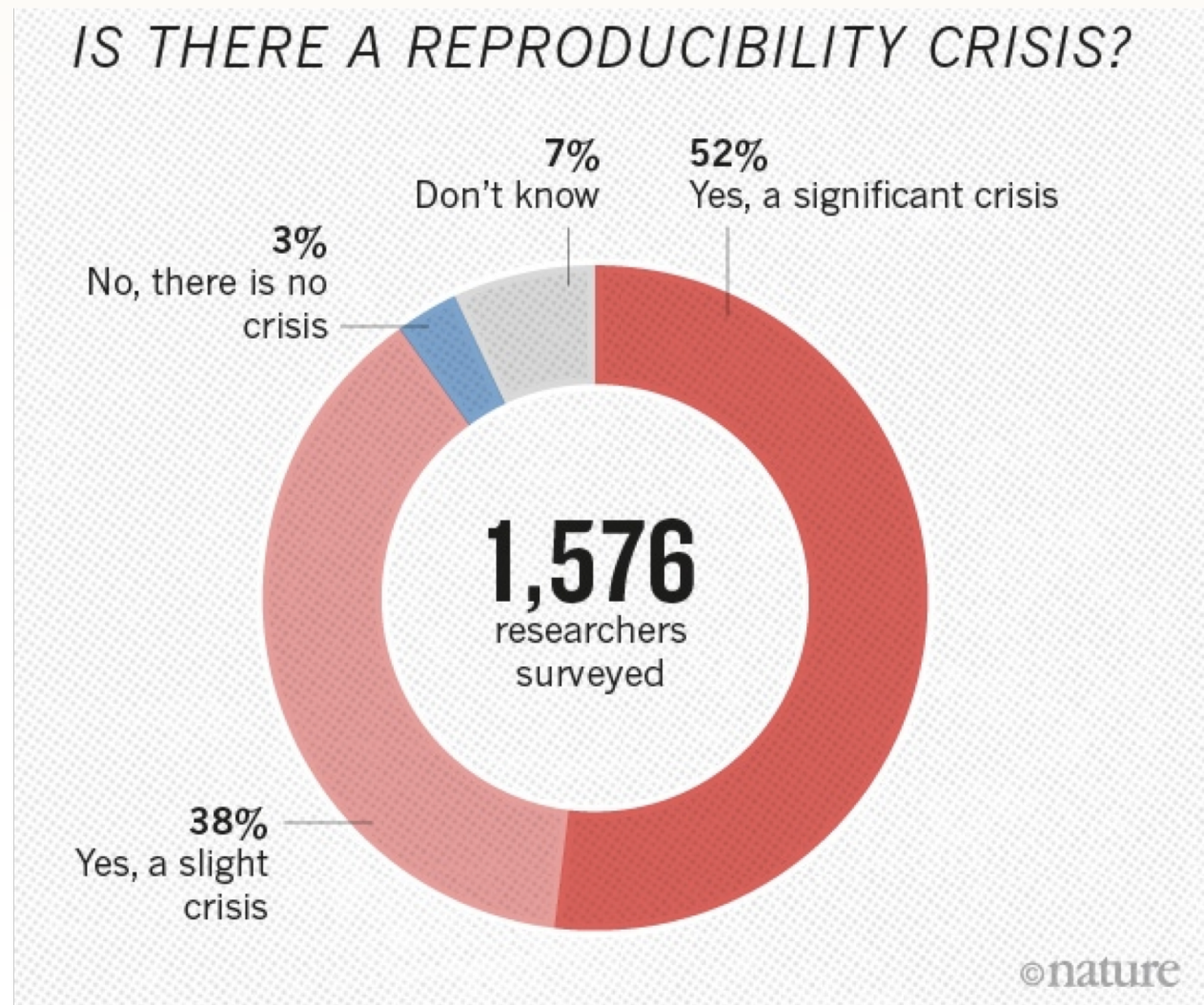
Nature, **533,** 452–454 (26 May 2016) doi:10.1038/533452a
http://www.nature.com/news/1-500-scientists-lift-the-lid-on-reproducibility-1.19970

Is this narrative wrong?

- **Opinion: Is science really facing a reproducibility crisis, and do we need it to?**

- Daniele Fanelli

- PNAS March 12, 2018. 201708272; published ahead of print March 12, 2018. https://doi.org/10.1073/pnas.1708272114

- "In light of multiple recent studies, there is no evidence that scientific misconduct and QRPs have increased. The number of yearly findings of scientific misconduct by the US Office of Research Integrity (ORI) has not increased, nor has the proportion, of all ORI investigations, that resulted in a finding of misconduct."

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The Solution = Open Research

Distribute dissemination across the research lifecycle and reward it

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But what are we talking about?

- There are so many different definitions of Open Research/Science that now there is an attempt to define the definitions https://im2punt0.wordpress.com/2017/03/27/defining-open-science-definitions/

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List of scholarly commons & charters

Over 90 declarations and position statements from around the world

Statement/declaration	Year	link
San Francisco Declaration on Research Assessment	2012	http://www.ascb.org/dora/
Force11 Joint Declaration on Data Citation Principles	2014	https://www.force11.org/datacitation
FAIR data principles	2015	https://www.force11.org/group/fairgroup/fairprinciples
Science International - (draft) Accord on Open Data	2015	http://www.icsu.org/news-centre/news/science-international-to-agree-international-accord-on-open-data
Leiden Manifesto for research metrics	2015	http://www.nature.com/news/bibliometrics-the-leiden-manifesto-for-research-metrics-1.17351
Science Europe Principles on Open Access publisher services	2015	http://www.scienceeurope.org/uploads/PressReleases/270415_Open_Access_New_Principles.pdf
European open science cloud for research - position paper	2015	http://libereurope.eu/wp-content/uploads/2015/11/OSC_Position_Paper-final-30.10.15.pdf
The Hague declaration on Knowledge Creation in the Digital Age	2015	http://thehaguedeclaration.com/
Principles of the Scholarly Commons	2017	https://www.force11.org/scholarly-commons/principles

http://tinyurl.com/scholcomm-charters

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All of these statements reflect Merton

- The four Mertonian norms of science (1942)
  - **universalism**: scientific validity is independent of the sociopolitical status/personal attributes of its participants
  - **communalism**: all scientists should have common ownership of scientific goods (intellectual property), to promote collective collaboration; secrecy is the opposite of this norm.
  - **disinterestedness**: scientific institutions act for the benefit of a common scientific enterprise, rather than for the personal gain of individuals within them
  - **organized scepticism**: scientific claims should be exposed to critical scrutiny before being accepted: both in methodology and institutional codes of conduct.

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Open data is a core principle
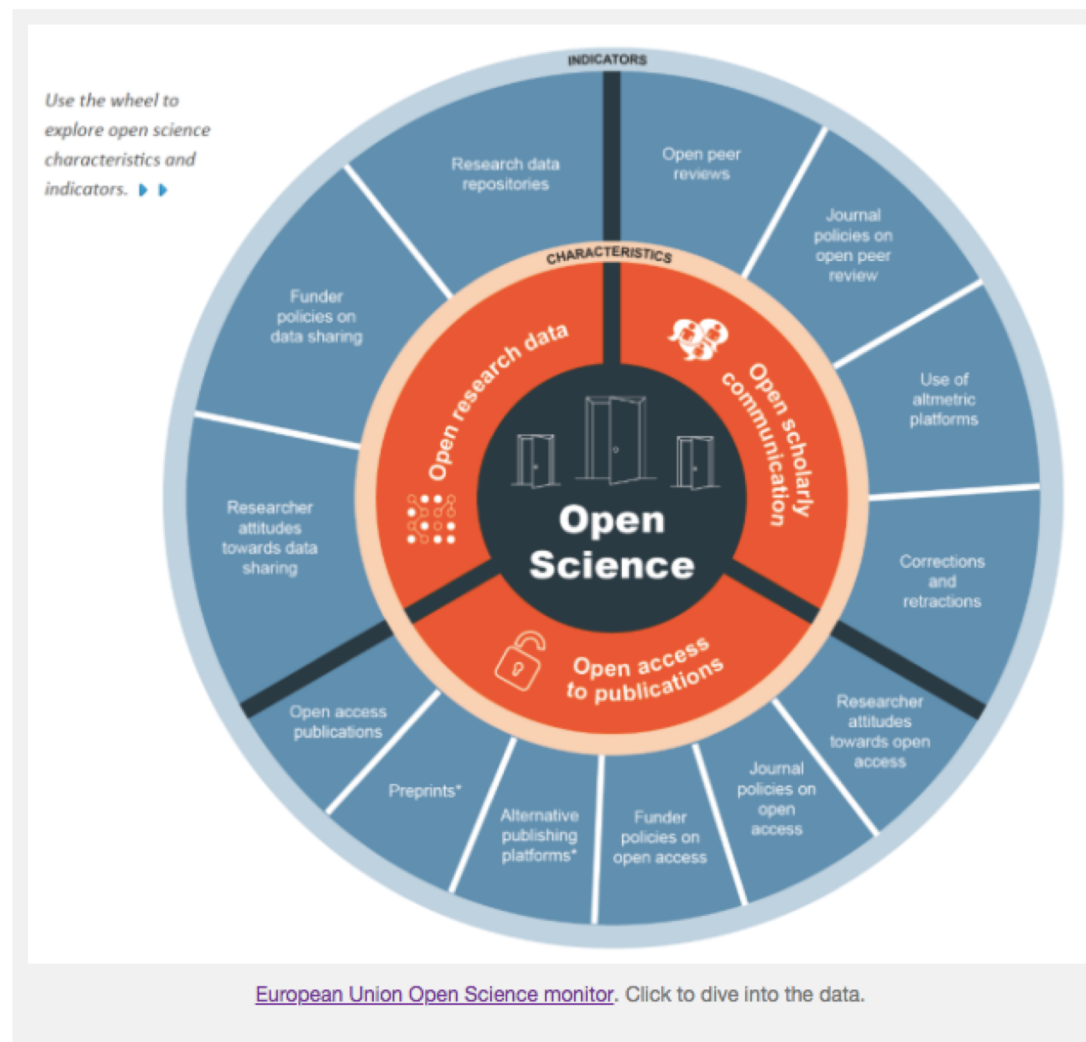
Open Science Monitor - European Commission. 28 March 2017
http://ec.europa.eu/research/openscience/index.cfm?pg=home&section=monitor

Recommendations

- DATA HANDLING

- 4. Researchers should make their data available for public inspection after publication of their results.

- 5. Researchers should experiment with born-open data—data archived in an open-access repository at the moment of its creation, and automatically time-stamped.

THE IRREPRODUCIBILITY CRISIS OF MODERN SCIENCE

Causes, Consequences, and the Road to Reform

DAVID RANDALL AND CHRISTOPHER WELSER
NATIONAL ASSOCIATION OF SCHOLARS
APRIL 2018
ISBN: 978-0-9986635-5-5

NAS

https://www.nas.org/images/documents/NAS_irreproducibility Report.pdf

The challenges of implementing Open Science

It is difficult to get ANY change in research institutions

We need institutions to play along

- "Improving the quality of research requires change at the institutional level"

  - Smaldino PE, McElreath R. 2016 The natural selection of bad science. R. Soc. open sci.3: 160384. http://dx.doi.org/10.1098/rsos.160384

- "Universities and research institutes should play a major role in supporting an open data culture"

  - Science as an open enterprise The Royal Society Science Policy Centre report 02/12 Issued: June 2012 DES24782https://royalsociety.org/~/media/policy/projects/sape/2012-06-20-saoe.pdf

Resistance
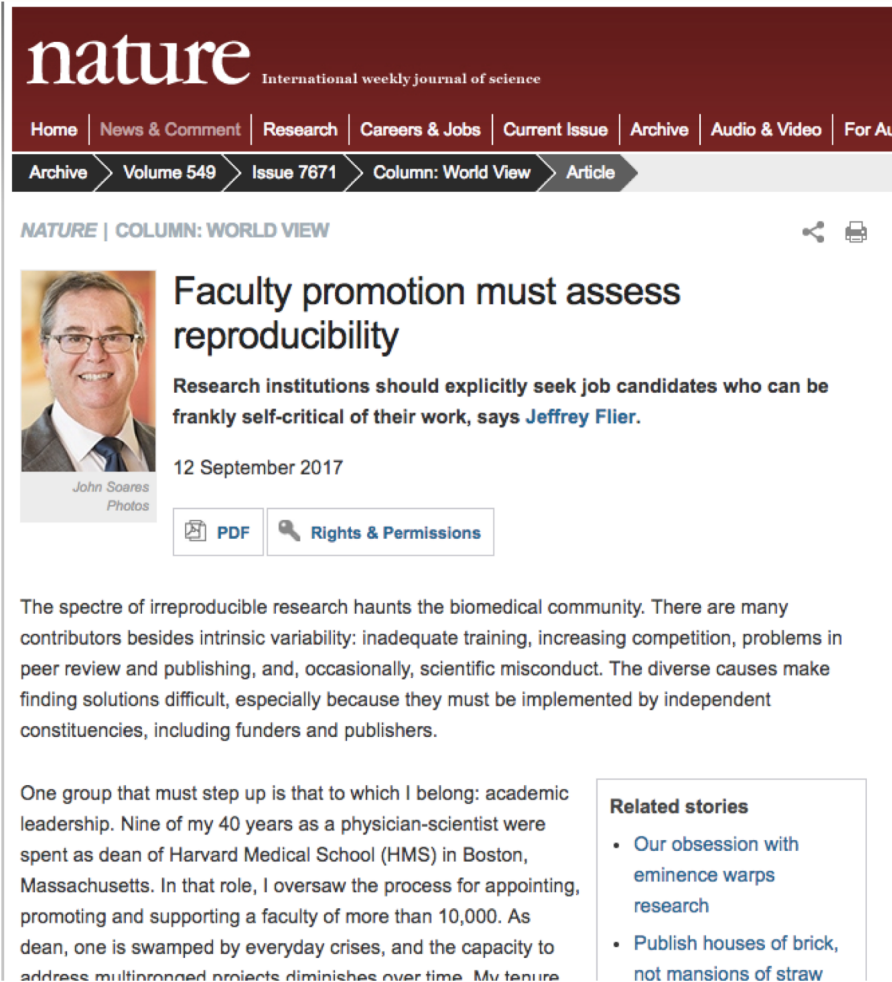
- Generally institutions are reluctant to step up, partly because of the governance structure.

- **The nature of research itself is changing profoundly**. This includes extraordinary dependence on data, and complexity requiring intermediate steps of data visualisation. **These eResearch techniques have been growing rapidly, and in a way that may not be understood or well led by senior administrators.**

  - "Openness, integrity & supporting researchers" Emeritus Professor Tom Cochrane
  https://unlockingresearch.blog.lib.cam.ac.uk/?p=307

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Open can mean success

- McGill University's Montreal Neurological Institute and Hospital, Canada
  - First academic institution to adopt an open science approach
  - Institute has received considerable donations in the wake of this decision
  - $20 million in January 2017 to establish the Tanenbaum Open Science Institute
  https://www.mcgill.ca/newsroom/channels/news/mcgill-university-announces-transformative-20-million-donation-montreal-neurological-institute-and-264838

A call to arms – 12 Sept 2017

nature — International weekly journal of science

Home | News & Comment | Research | Careers & Jobs | Current Issue | Archive | Audio & Video | For Au

Archive > Volume 549 > Issue 7671 > Column: World View > Article

NATURE | COLUMN: WORLD VIEW

Faculty promotion must assess reproducibility

Research institutions should explicitly seek job candidates who can be frankly self-critical of their work, says Jeffrey Flier.

12 September 2017

John Soares Photos

PDF   Rights & Permissions

The spectre of irreproducible research haunts the biomedical community. There are many contributors besides intrinsic variability: inadequate training, increasing competition, problems in peer review and publishing, and, occasionally, scientific misconduct. The diverse causes make finding solutions difficult, especially because they must be implemented by independent constituencies, including funders and publishers.

One group that must step up is that to which I belong: academic leadership. Nine of my 40 years as a physician-scientist were spent as dean of Harvard Medical School (HMS) in Boston, Massachusetts. In that role, I oversaw the process for appointing, promoting and supporting a faculty of more than 10,000. As dean, one is swamped by everyday crises, and the capacity to address multipronged projects diminishes over time. My tenure

Related stories

- Our obsession with eminence warps research
- Publish houses of brick, not mansions of straw

- One group that must step up is that to which I belong: academic leadership.

- Academic institutions can and must do better. We should be taking multiple approaches to make science more reliable. One of the most effective (but least discussed) is to change how we appoint and promote our faculty members.

- Our processes should encourage evaluators to say whether they feel candidates' work is problematic or overstated, and whether it has been reproduced and broadly accepted.

http://www.nature.com/news/faculty-promotion-must-assess-reproducibility-1.22596

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Start at the beginning not the end

080409 revolving door-1 by Dan4th Nicholas CC-BY 2.0

- Making data and other non traditional research outputs available is difficult

- We need to train our research community in how to research openly
  - "Is Democracy the Right System? Collaborative Approaches to Building an Engaged RDM Community" (2017) http://biorxiv.org/content/early/2017/01/28/103895

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Some institutions are standing up

Stand out from the crowd by Steven Depolo Flickr Licensed Under CC BY 2.0

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LERU paper on Open Science

- The paper, including "The eight dimensions of open science: a roadmap for universities", was approved by the Rectors´ Assembly last weekend.

- On Tuesday 29th May LERU will publish the electronic version of the paper.

- The launch event will take place in Brussels on 12th June (09.00-11.00)

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Tu Delft – of course!

FEBRUARY 4, 2018

TU Delft Strategic Framework 2018-2024: what does it mean for Open Science?

Impact for a better society

TU Delft Strategic Framework 2018-2024

TU Delft published its new Strategic Framework 2018-2024 on 12 January, during the Open Science Symposium and its 176th birthday celebration.
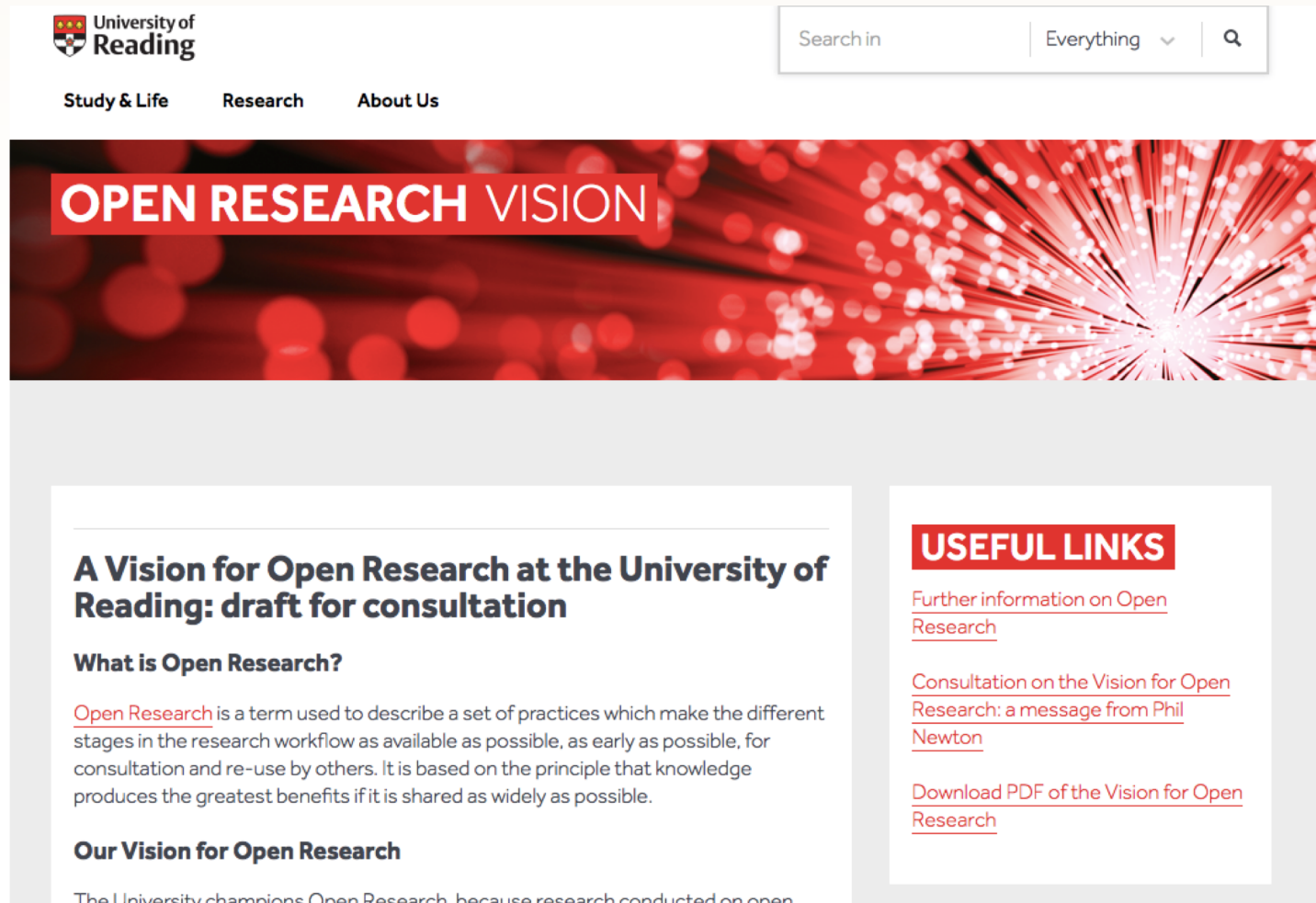
https://openworking.wordpress.com/2018/02/04/tu-delft-strategic-framework-2018-2024-what-does-it-mean-for-open-science/

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Starting out

- Kings College London have an Open Research group with a terms of Reference including 'to raise awareness, encourage engagement and champion good open research practice for research data and scholarly publications across the academic community"

- Sussex University has support to develop a position statement around Open Research (and specifically Open Publishing)

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University of Reading's 'vision statement'

https://www.reading.ac.uk/research/open-research.aspx

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University of Reading

- Successful open research themed conference style event at Reading at end of March 2017

- Decided to create a statement about our overarching principles a philosophical foundation about the benefits of adopting these kinds of practices – the OA and RDM policies sit under this.

- Pre-testing showed need to translate in very clear terms - it is very easy for the audience to read things through their own preconceptions

- Launched the consultation on 20th February, was closed on 14 April. Report being written now (response rate was low).

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Open Typology

The Cambridge survey focused on Content and Infrastructure (Development seemed too conceptual)

- Open Content
    - Open access to research publications (OA)
    - Open data
    - Open educational resources (OER, including open courseware)
    - Open bibliography (also known as open metadata)
    - Open source software (OSS)
- Open Development
    - Open development (also known as open development method, ODM)
    - Open educational practices (OEP)
    - Open peer review
    - Open science/open research
    - Open innovation
- Open Infrastructure
    - Open standards
    - Open systems

- Corrall, S., & Pinfield, S. (2014). Coherence of "Open" Initiatives in Higher Education and Research: Framing a Policy Agenda. In iConference 2014 Proceedings (p. 293 - 313). doi:10.9776/14085 http://hdl.handle.net/2142/47316

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University of Cambridge

- Currently running a consultation with the community to understand attitudes towards Open Research

- Survey closed on 21 May

- Over 300 individual responses

Breakdown by School

3.99%
1.81%
4.35%

25.36%

26.09%

6.16%

10.87%

21.38%
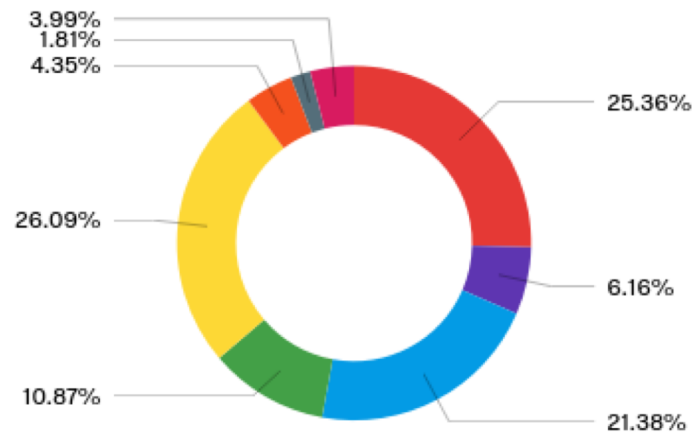
School of Biological Sciences (please write your Department/Faculty)

School of Physical Sciences (please write your Department/Faculty)

School of Clinical Medicine (please write your Department/Faculty)

School of Arts and Humanities (please write your Department/Faculty)

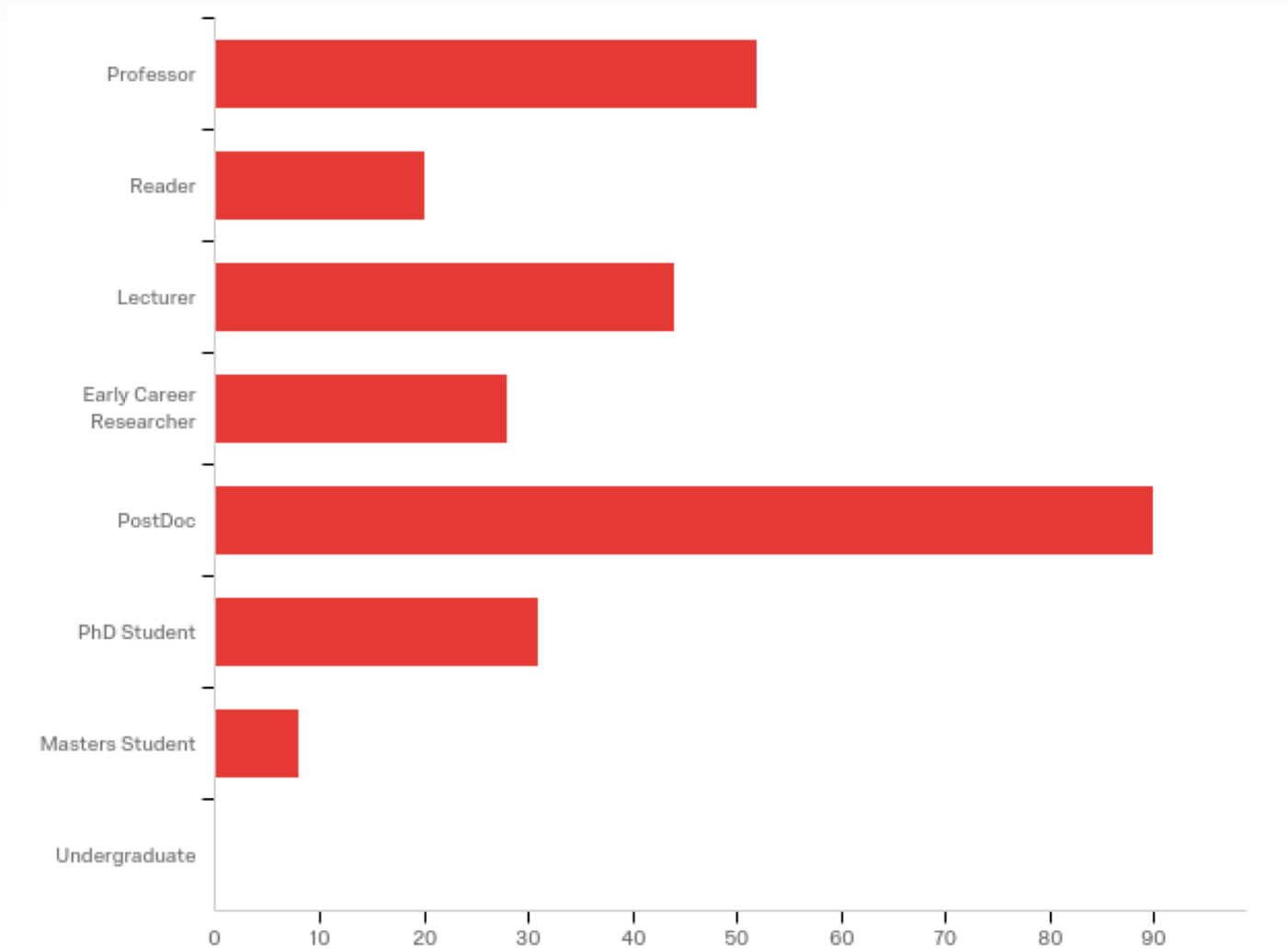School of Humanities and Social Sciences (please write your Department/Faculty)

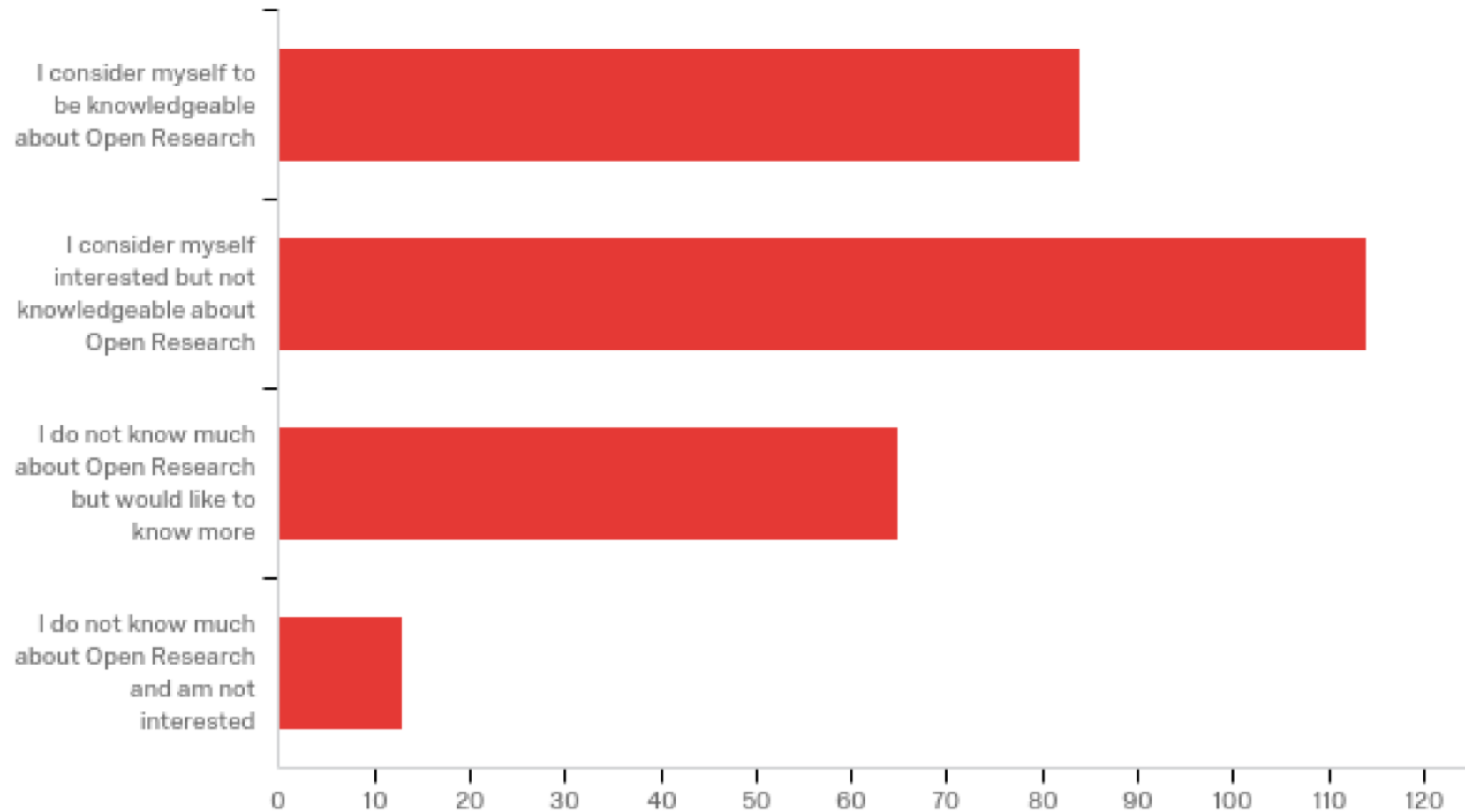School of Technology (please write your Department/Faculty)   College (please specify)   Other

Type of researcher

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Self assessment of knowledge

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In summary....

- The credibility of science is under threat – we are living in a 'post truth' world

- Reproducibility issues are gaining considerable attention

- Open Science offers a solution

- Data sharing is integral to this

- Implementing Open Science is challenging

- Some institutions are taking action

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We need to keep a grip on this situation
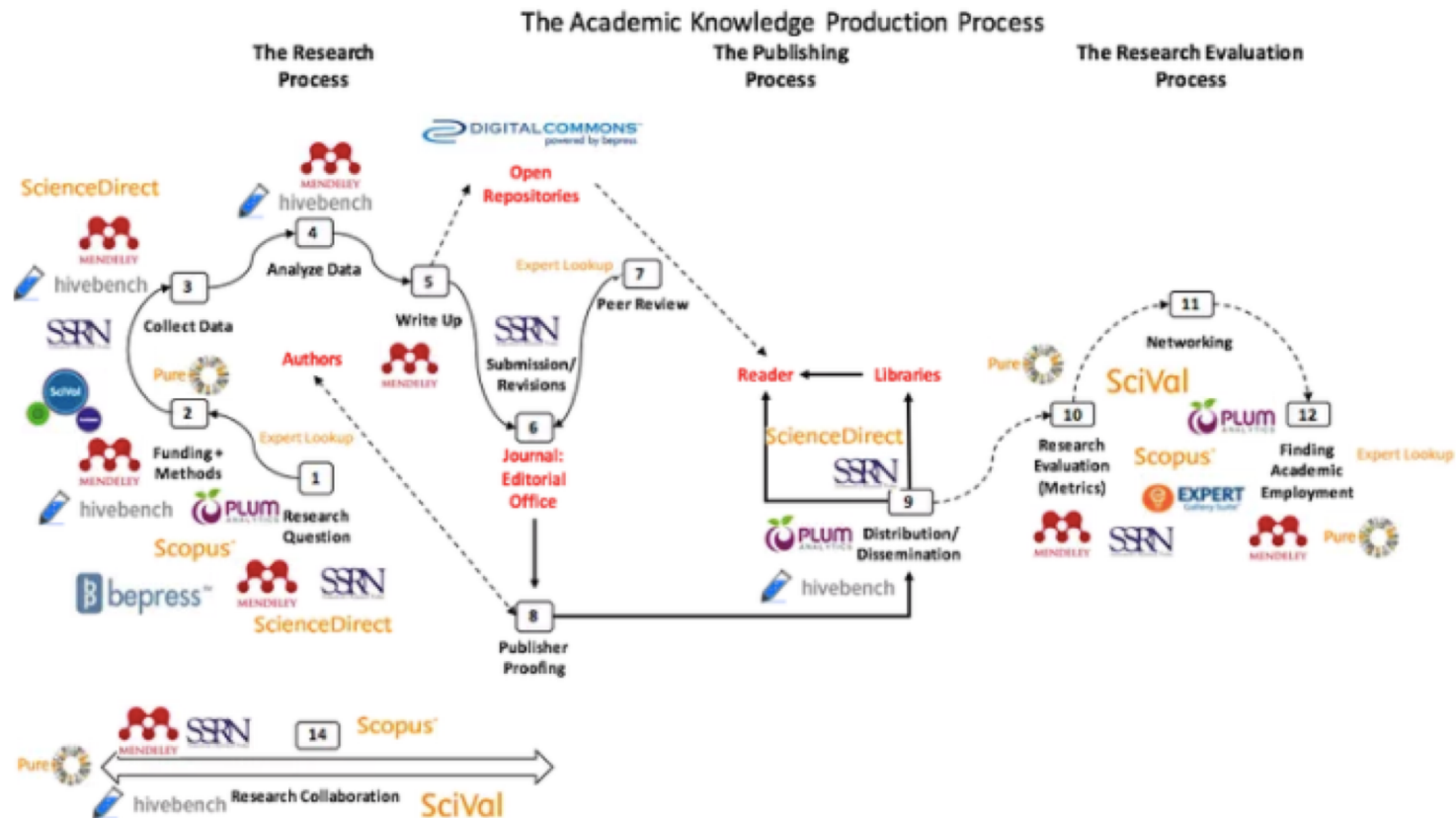
Vertical integration resulting from Elsevier's acquisitions, from Alejandro Posada and George Chen, (2017) *Rent Seeking and Financialization strategies of the Academic Publishing Industry - Publishers are increasingly in control of scholarly infrastructure and why we should care- A Case Study of Elsevier*
http://knowledgegap.org/index.php/sub-projects/rent-seeking-and-financialization-of-the-academic-publishing-industry/preliminary-findings/

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If you are interested….

- Keynote - *Is the tail wagging the dog? Perversity in academic rewards -* COASP, 2017
  - SLIDES - https://www.repository.cam.ac.uk/handle/1810/267263
  - VIDEO - http://coaspvideos.org/2016/videos/play/1401

- Keynote – *Reward, reproducibility and recognition in research - the case for going Open -* Tromso, 2016
  - SLIDES - https://www.slideshare.net/DannyKingsley/reward-reproducibility-and-recognition-in-research-the-case-forgoing-open
  - VIDEO – http://septentrio.uit.no/index.php/SCS/article/view/4036

- Blog series - *The Case for Open Research*
  - July & August 2016
  - https://unlockingresearch.blog.lib.cam.ac.uk/?page_id=2#OpenResearch

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Questions/Discussion

Thanks!

Dr Danny Kingsley

Head of Scholarly Communication

University of Cambridge

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