Institutional Framework and Responsibilities:
Facing Open Science's challenges and assuring quality of research

LERU workshop:
Nurturing a Culture of Responsible Research in the Era of Open Science
Campus Biotech, Geneva
25 May 2018

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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

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."

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During the Brexit discussion

Britain has had enough of experts, says Gove

Brexit campaigner offers to have disputed EU contribution figure audited
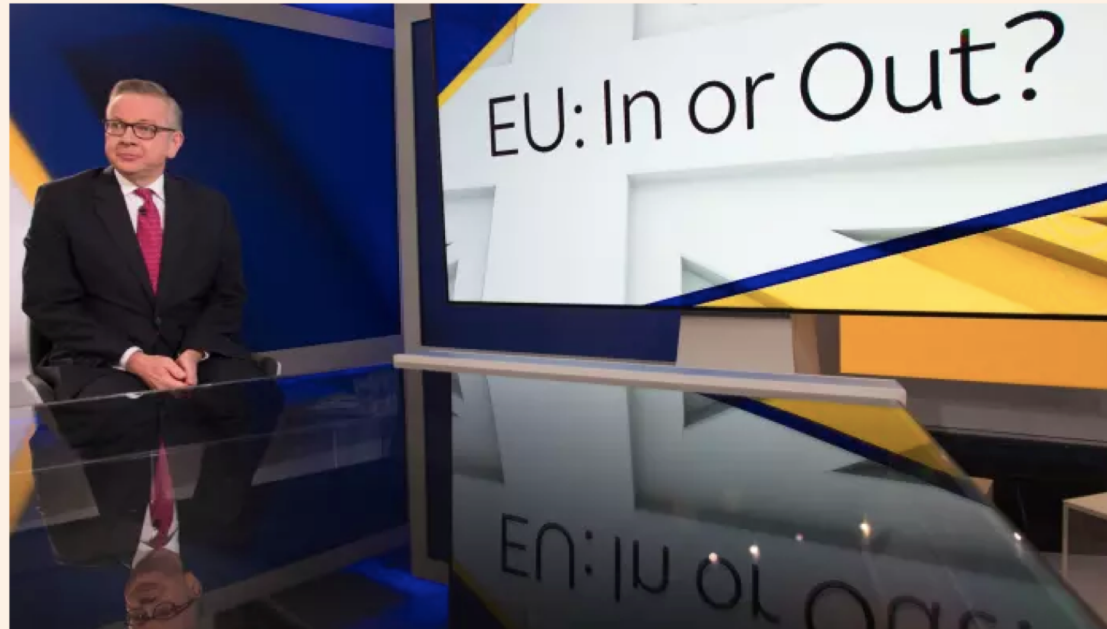
Justice Secretary Michael Gove takes part in a live Sky News Q&A on Brexit © PA

Henry Mance, Political correspondent JUNE 3, 2016

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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

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This is our new reality

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Reproducibility

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

Image by Danny Kingsley

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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/
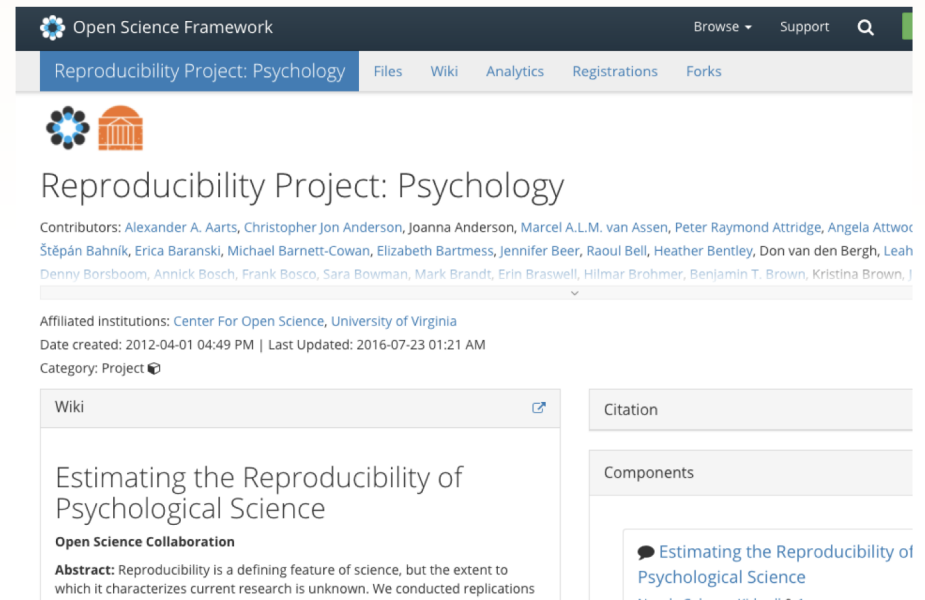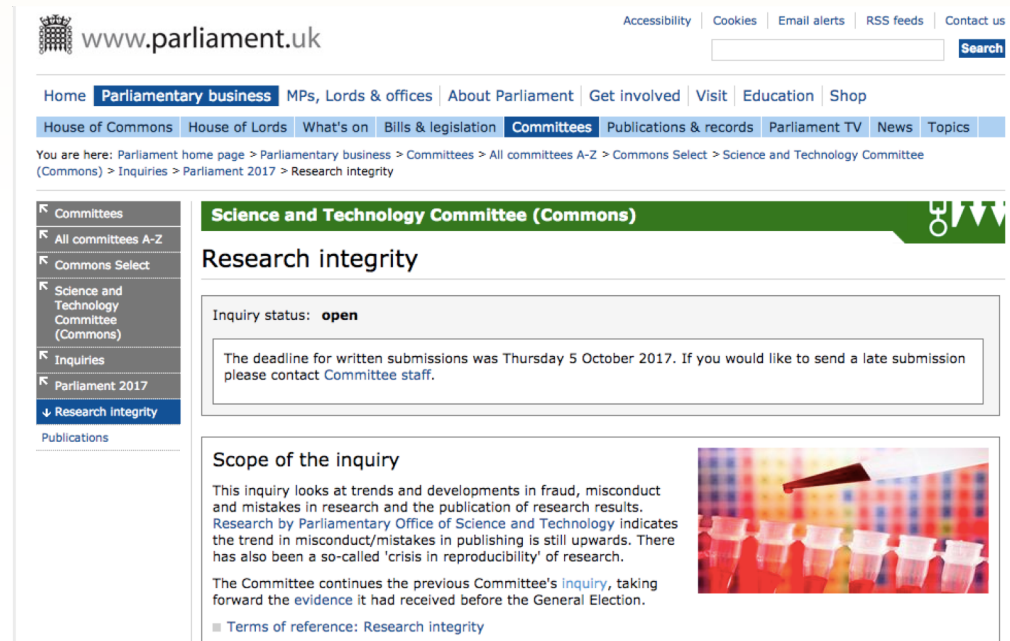
UK Government Science & Technology Committee

- ## 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/
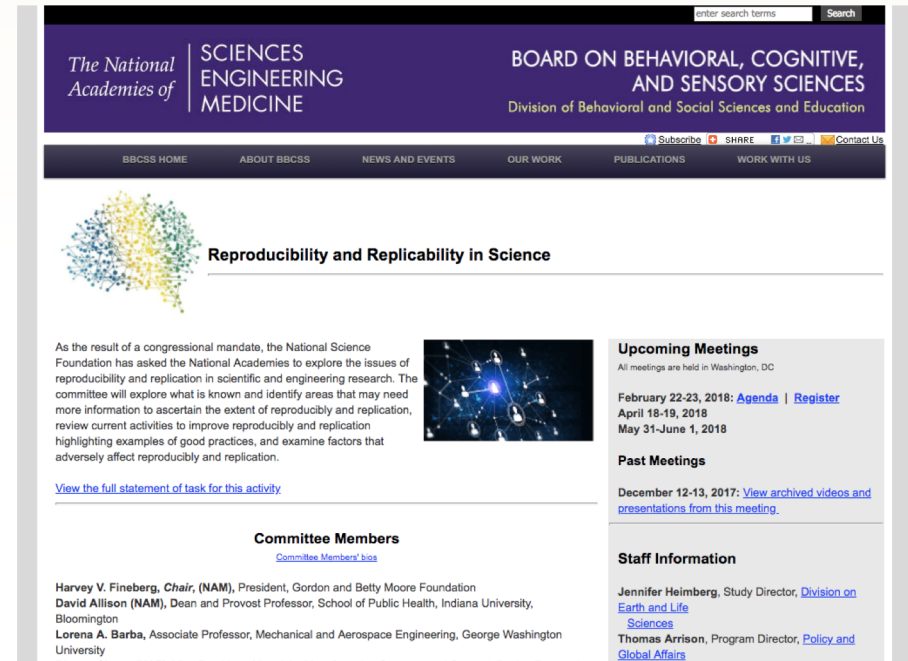
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Early days in US

- 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

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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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

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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.

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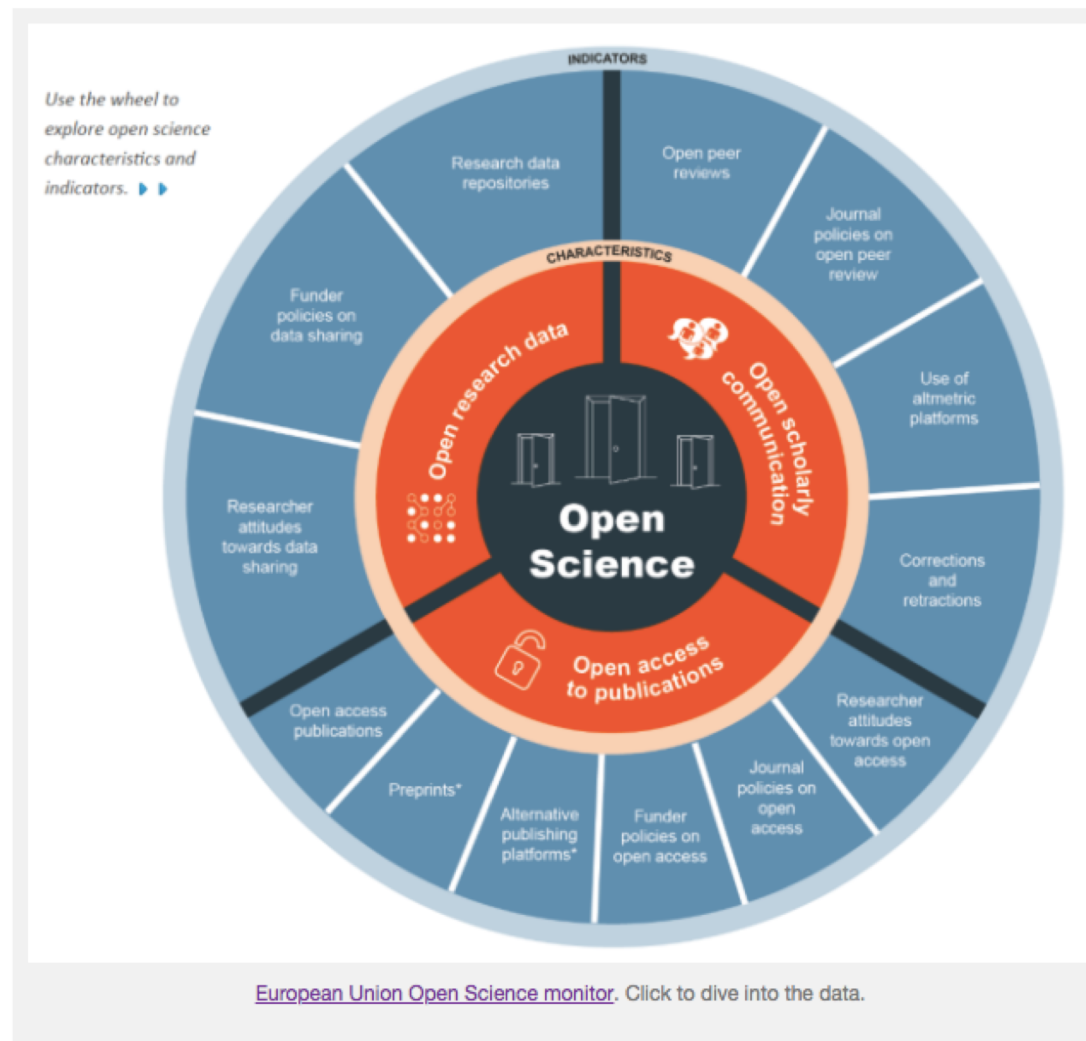
Open Science Monitor - European Commission. 28 March 2017
http://ec.europa.eu/research/openscience/index.cfm?pg=home&section=monitor

The challenges of implementing Open Science

Image by Danny Kingsley

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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

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Roadmap for institutions

- LERU paper on Open Science was approved by the Rectors´ Assembly last weekend.
- Electronic version published of the paper - 29th May 2018
- Launch event in Brussels - 12th June 2018
- Includes "The eight dimensions of open science: a roadmap for universities":
  - The future of scholarly publishing
  - The European Open Science cloud (EOSC)
  - FAIR data
  - Skills
  - Research integrity
  - Rewards
  - Altmetrics
  - Citizen science

Some institutions are standing up

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Tu Delft

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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Utrecht University
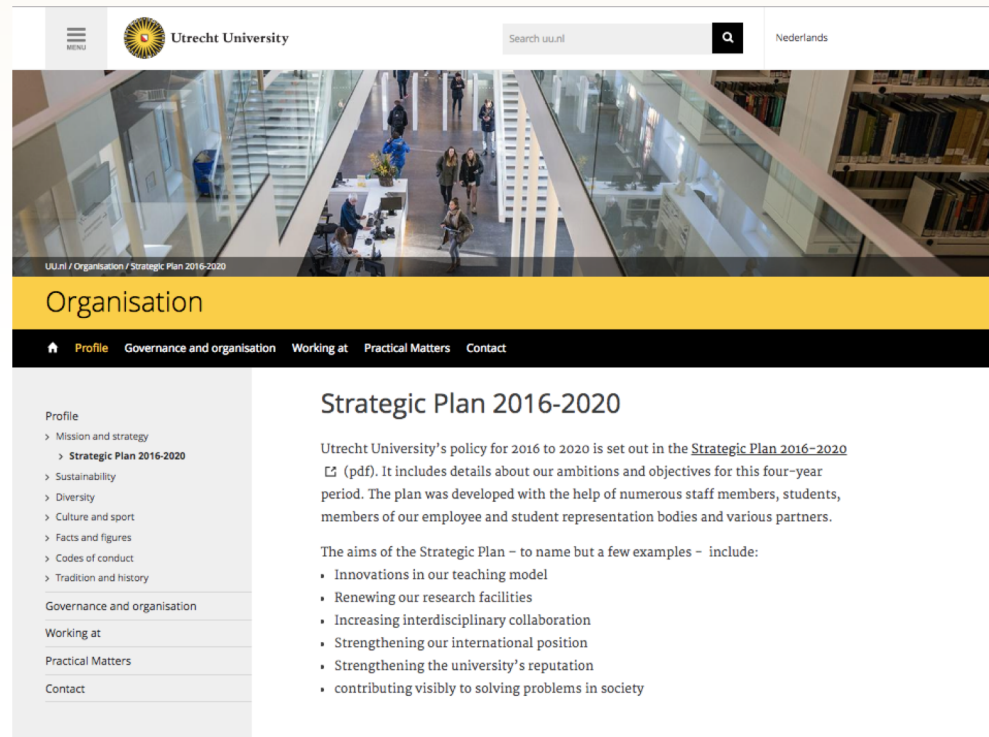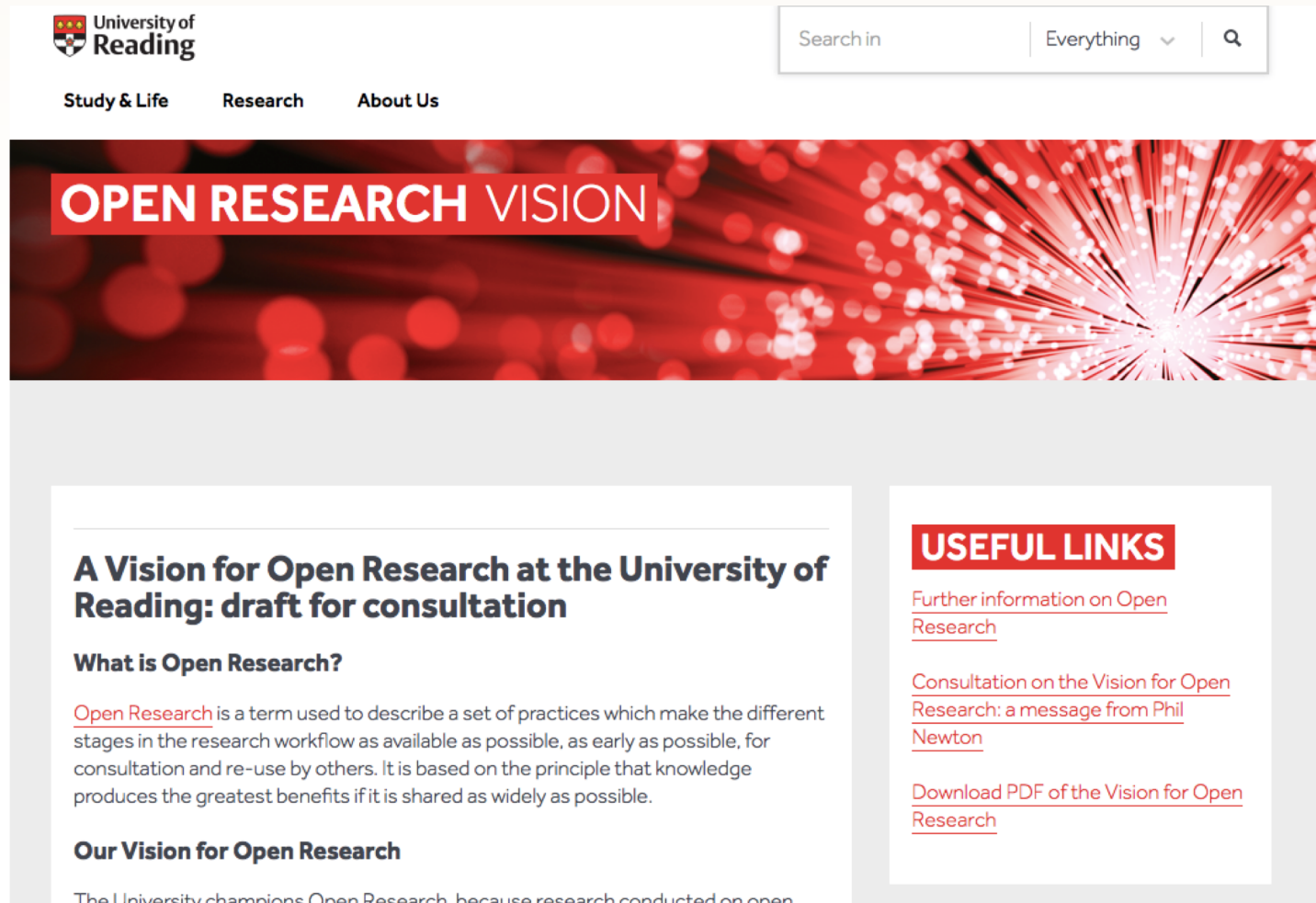
"Utrecht University aims to operate at the forefront of Open Science."

The University Strategic Plan 2016-2020
https://www.uu.nl/en/organisation/strategic-plan-2016-2020

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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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Challenge 1 - the language problem
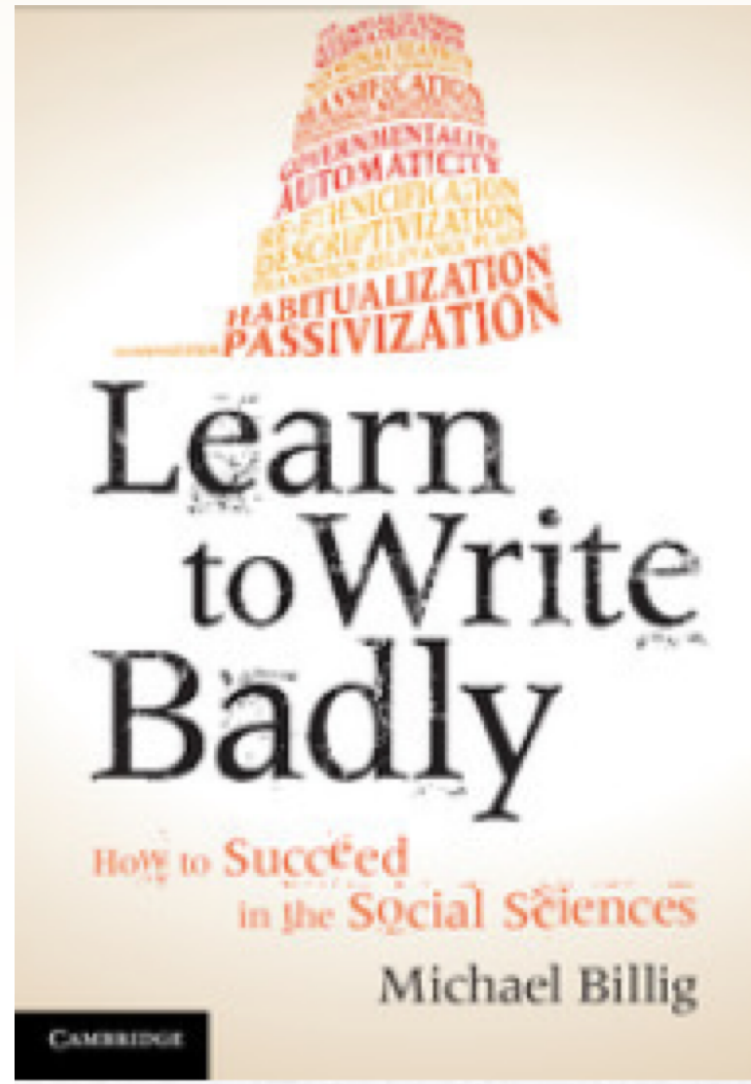
University of Cambridge

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

- Phase 1 of the survey closed on 21 May, will finally close 4 June

- Over 300 individual responses to date

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Cambridge survey focused on Content & 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
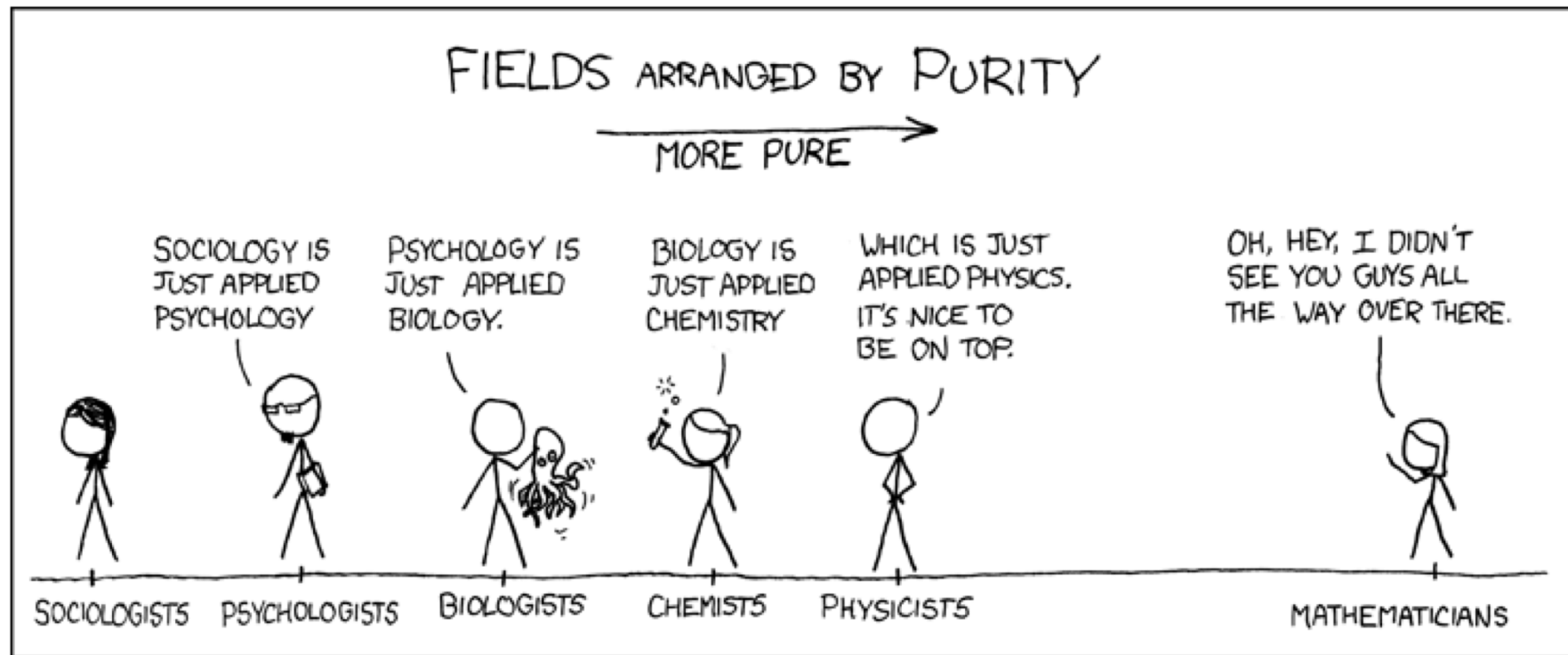
Type of researcher
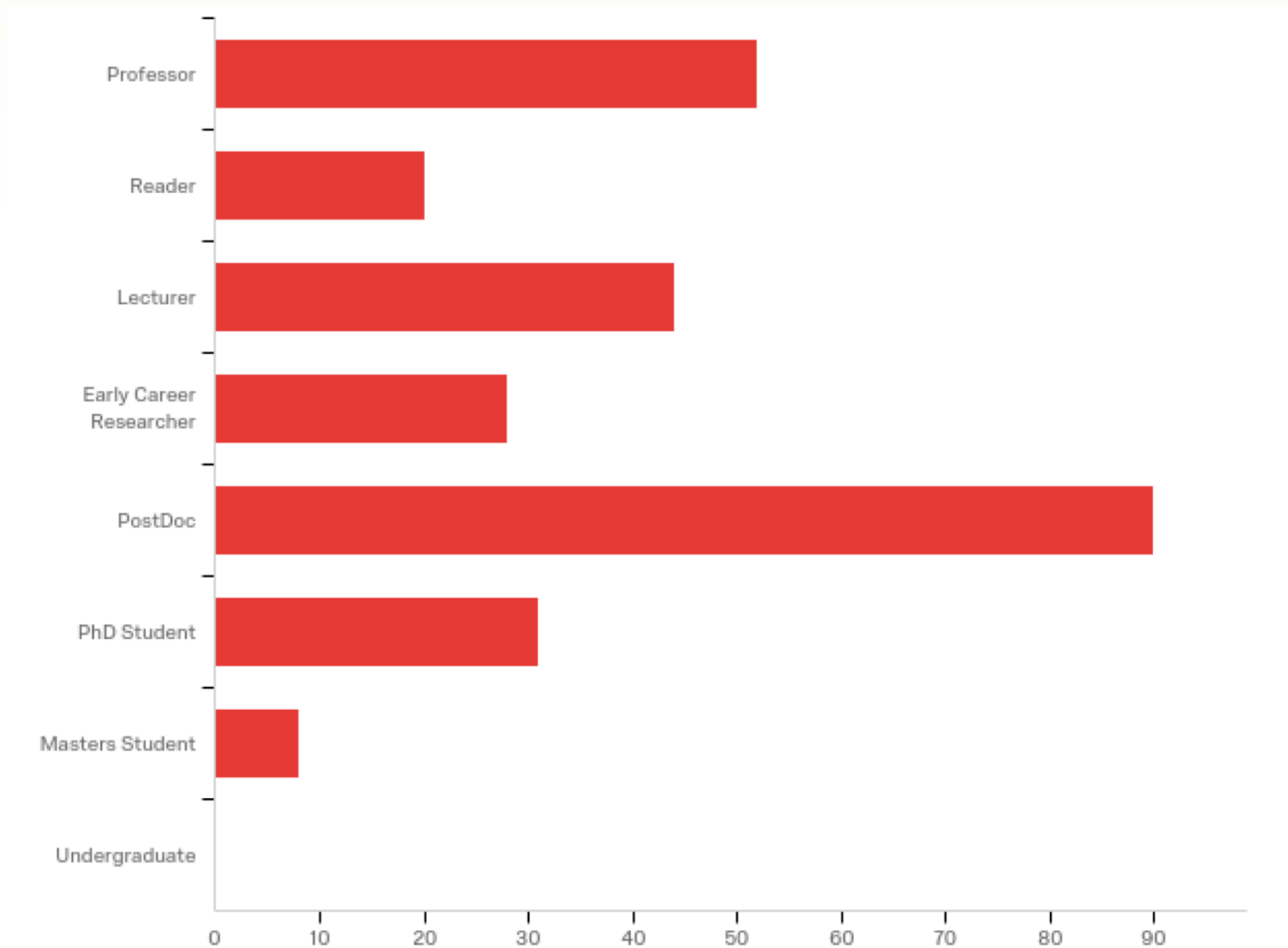
Self assessment of knowledge

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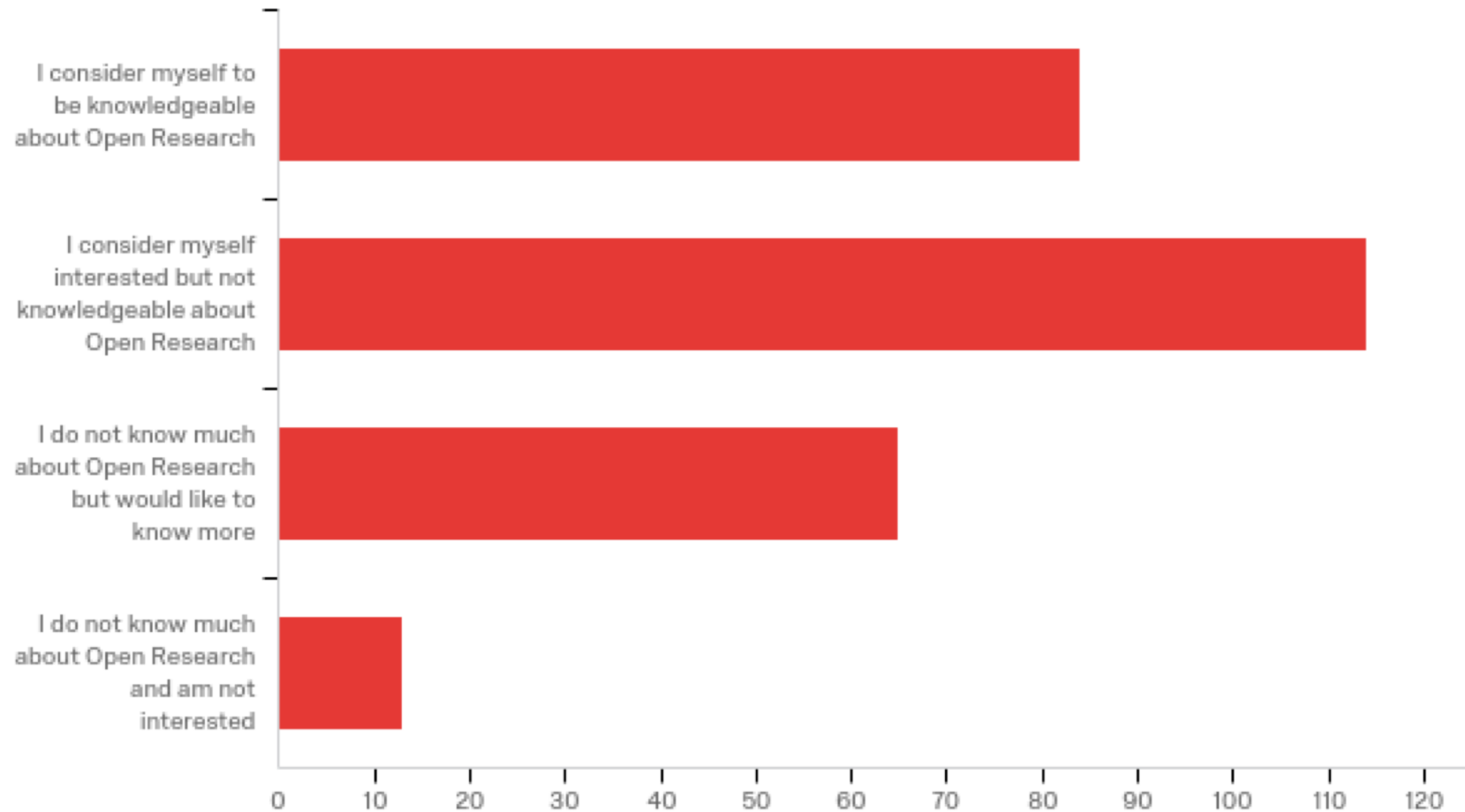
Lack of clarity

- Answers to: Are there any other ways you are working in an open manner?
  - 'I realise from previous section that I am so engaged - wasn't familiar with the term prior to this survey'
  - Several said:
    - 'Sharing with colleagues in my department' and
    - 'Presenting at conferences'

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Challenge 2 - disciplinary differences

Comic by XKCD - https://xkcd.com/435/

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Disciplinary specific

Biomedical researchers	actively practice open research
Clinical researchers	practising open research
Population and public health researchers	experience challenges in data sharing that need addressing
Humanities researchers	have very little experience of data sharing and seemingly not much could motivate them to share their data
Social science researchers	little experience of data sharing and reuse and perceive minimal benefits from data sharing

Van den Eynden, Veerle et al. (2016) *Towards Open Research: practices, experiences, barriers and opportunities*. Wellcome Trust.
https://dx.doi.org/10.6084/m9.figshare.4055448

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Challenge 3 - broader issues

Research is changing and work conditions are changing. It might not be a good time.

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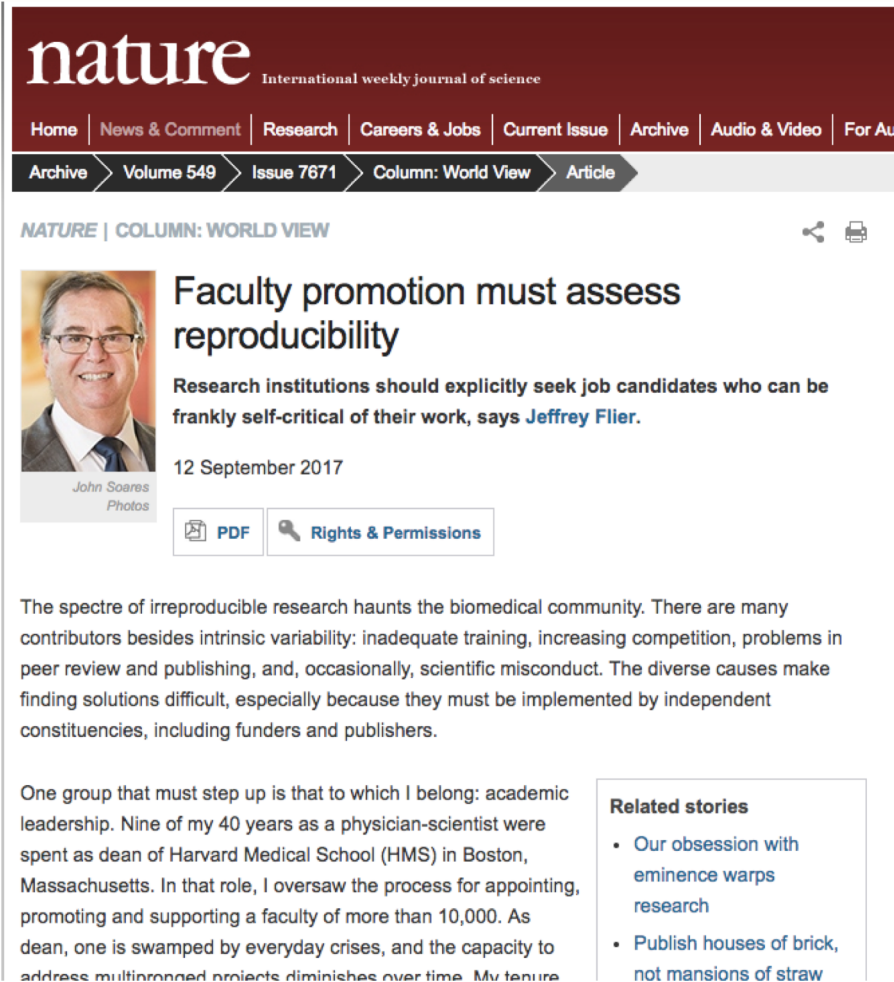
Challenge 4 – need to incentivise

Image: Flickr Jason Taellious reward – CC-BY-SA 2.0

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A call to arms

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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UK institutions incentivising open scholarship

- One institution reviewing promotions around "what is excellence and how do we measure it?" in which "excellence in openness" is being considered.

- Two institutions offer "Open Scholar of the Year" awards, one of which also offers a competition for ECRs / PGRs, the prize for which would be filming of a mini documentary about their research so that they can promote it to a wider audience.

- One institution reported considering rolling up their open data and paper policies into a broader 'open science' policy.

- In Ireland they have some system level openness indicators:
  - % of publications deposited in Open Access repositories
  - Number of researchers trained in FAIR data management

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Attempt to track this

- "Open Scholarship and Open Science: Recognition and Reward" https://www.mendeley.com/community/open-scholarship-recognition-and-reward/ open to all to access and contribute to.

- Research Data Sharing includes a folder entitled: "Rewards and Incentives for Data Sharing" https://www.mendeley.com/community/research-data-sharing/

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In summary….

- Institutions need to step into this space. But:
  – Language is a problem
  – Solutions look different to different disciplines
  – Researchers feel under siege
  – The reward structure is crucial

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Questions/Discussion

Thanks!

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