

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

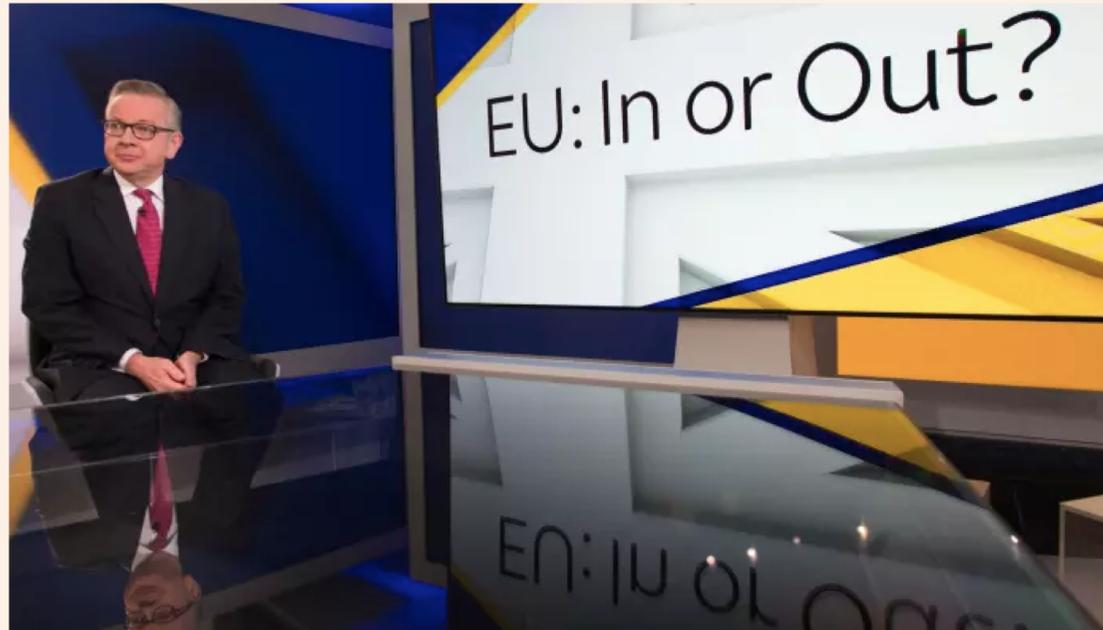
- “**Incipient and actual attacks upon the integrity of science** have led scientists to recognize their dependence on particular types of social structure. Manifestos and pronouncements by associations of scientists are devoted to the relations of science and society. **An institution under attack must 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.”



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>



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>



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



<https://thenorwichradical.com/2017/01/12/post-truth-politics-and-the-war-on-intellect/>

Reproducibility



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

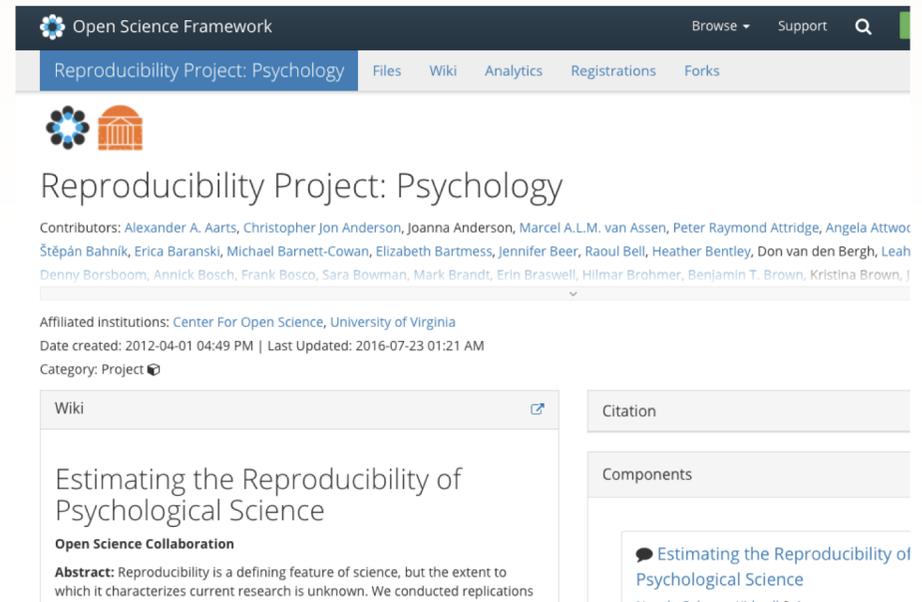


Image by Danny Kingsley

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



Open Science Framework

Reproducibility Project: Psychology

Contributors: Alexander A. Aarts, Christopher Jon Anderson, Joanna Anderson, Marcel A.L.M. van Assen, Peter Raymond Attridge, Angela Attwool, Štěpán Bahník, Erica Baranski, Michael Barnett-Cowan, Elizabeth Bartmess, Jennifer Beer, Raoul Bell, Heather Bentley, Don van den Bergh, Leah Denny Borsboom, Annick Bosch, Frank Bosco, Sara Bowman, Mark Brandt, Erin Braswell, Hilmar Brohmer, Benjamin T. Brown, Kristina Brown, J. Daniel Cohen

Affiliated institutions: Center For Open Science, University of Virginia

Date created: 2012-04-01 04:49 PM | Last Updated: 2016-07-23 01:21 AM

Category: Project

Wiki

Estimating the Reproducibility of Psychological Science

Open Science Collaboration

Abstract: Reproducibility is a defining feature of science, but the extent to which it characterizes current research is unknown. We conducted replications...

Citation

Components

Estimating the Reproducibility of Psychological Science

<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/>



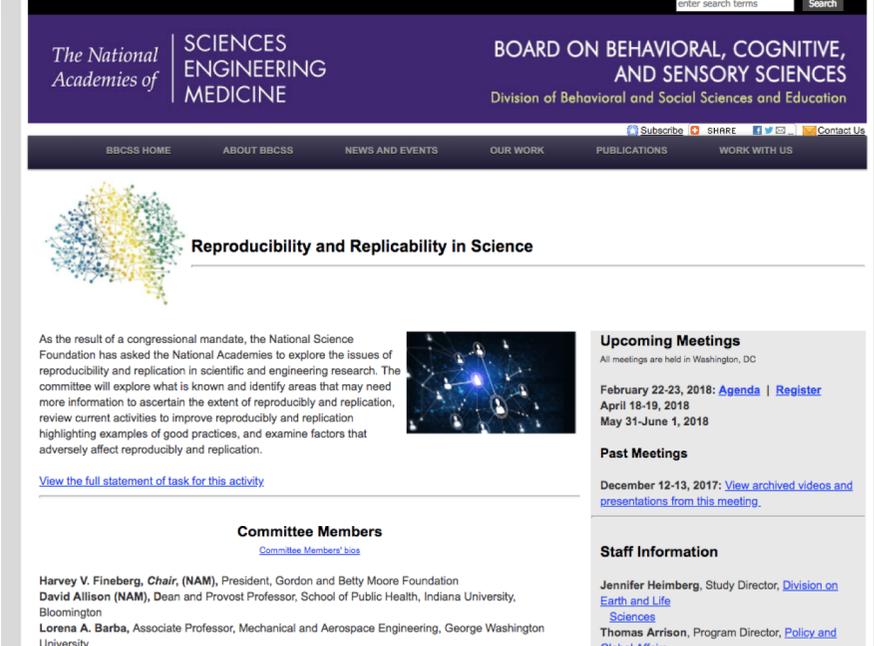
The screenshot shows the website www.parliament.uk. The main navigation bar includes links for Home, Parliamentary business, MPs, Lords & offices, About Parliament, Get involved, Visit, Education, and Shop. A secondary navigation bar lists House of Commons, House of Lords, What's on, Bills & legislation, Committees, Publications & records, Parliament TV, News, and Topics. The breadcrumb trail reads: You are here: Parliament home page > Parliamentary business > Committees > All committees A-Z > Commons Select > Science and Technology Committee (Commons) > Inquiries > Parliament 2017 > Research integrity. The page title is "Science and Technology Committee (Commons) Research integrity". The inquiry status is "open". A notice states: "The deadline for written submissions was Thursday 5 October 2017. If you would like to send a late submission please contact Committee staff." The "Scope of the inquiry" section explains that the inquiry looks at trends and developments in fraud, misconduct, and mistakes in research and the publication of research results. It notes that research by the Parliamentary Office of Science and Technology indicates a trend in misconduct/mistakes in publishing is still upwards, and there has been a so-called 'crisis in reproducibility' of research. The Committee continues the previous Committee's inquiry, taking forward the evidence it had received before the General Election. A link for "Terms of reference: Research integrity" is provided. An image of a laboratory flask is visible on the right side of the page.



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



The screenshot shows the website for the Board on Behavioral, Cognitive, and Sensory Sciences (BBCSS). The header includes the National Academies of Sciences, Engineering, and Medicine logo, and the text 'BOARD ON BEHAVIORAL, COGNITIVE, AND SENSORY SCIENCES' and 'Division of Behavioral and Social Sciences and Education'. A search bar is in the top right. Below the header is a navigation menu with links: BBCSS HOME, ABOUT BBCSS, NEWS AND EVENTS, OUR WORK, PUBLICATIONS, and WORK WITH US. The main content area is titled 'Reproducibility and Replicability in Science' and features a colorful molecular structure graphic. The text describes the committee's mission: 'As the result of a congressional mandate, the National Science Foundation has asked the National Academies to explore the issues of reproducibility and replication in scientific and engineering research. The committee will explore what is known and identify areas that may need more information to ascertain the extent of reproducibility and replication, review current activities to improve reproducibility and replication highlighting examples of good practices, and examine factors that adversely affect reproducibility and replication.' A link to 'View the full statement of task for this activity' is provided. To the right, there are sections for 'Upcoming Meetings' (February 22-23, 2018; April 18-19, 2018; May 31-June 1, 2018) and 'Past Meetings' (December 12-13, 2017). A 'Staff Information' section lists Jennifer Heimberg, Thomas Arrison, and others.

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.”



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.



https://www.nas.org/images/documents/NAS_irreproducibility_Report.pdf



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>



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§ion=monitor>

The challenges of implementing Open Science

Image by Danny Kingsley



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
DES24782 <https://royalsociety.org/~media/policy/projects/sape/2012-06-20-saoe.pdf>



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

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



TU Delft

FEBRUARY 4, 2018

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

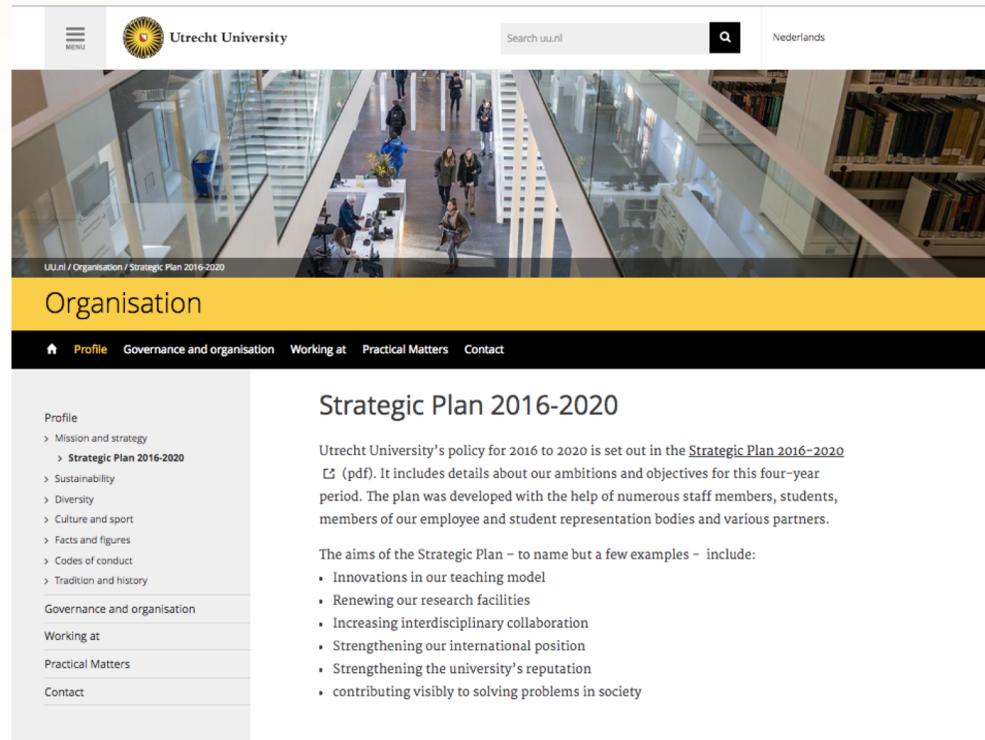


TU Delft published its new [Strategic Framework 2018-2024](#) on 12 January, during the [Open Science Symposium](#) and its 176th birthday celebration.

<https://openworking.wordpress.com/2018/02/04/tu-delft-strategic-framework-2018-2024-what-does-it-mean-for-open-science/>



Utrecht University



The screenshot shows the Utrecht University website. At the top, there is a navigation bar with the Utrecht University logo, a search bar, and the language 'Nederlands'. Below the navigation bar is a large image of a modern university building interior. A yellow banner below the image reads 'Organisation'. Underneath the banner is a black navigation bar with links: 'Profile', 'Governance and organisation', 'Working at', 'Practical Matters', and 'Contact'. The main content area is divided into two columns. The left column is a sidebar with a 'Profile' section containing a list of links: 'Mission and strategy', 'Strategic Plan 2016-2020', 'Sustainability', 'Diversity', 'Culture and sport', 'Facts and figures', 'Codes of conduct', and 'Tradition and history'. Below this is a 'Governance and organisation' section with links for 'Working at', 'Practical Matters', and 'Contact'. The right column is titled 'Strategic Plan 2016-2020' and contains the following text: 'Utrecht University's policy for 2016 to 2020 is set out in the [Strategic Plan 2016-2020](#) (pdf). It includes details about our ambitions and objectives for this four-year period. The plan was developed with the help of numerous staff members, students, members of our employee and student representation bodies and various partners.' Below this text is a list of aims: 'The aims of the Strategic Plan – to name but a few examples – include: • Innovations in our teaching model • Renewing our research facilities • Increasing interdisciplinary collaboration • Strengthening our international position • Strengthening the university's reputation • contributing visibly to solving problems in society'.

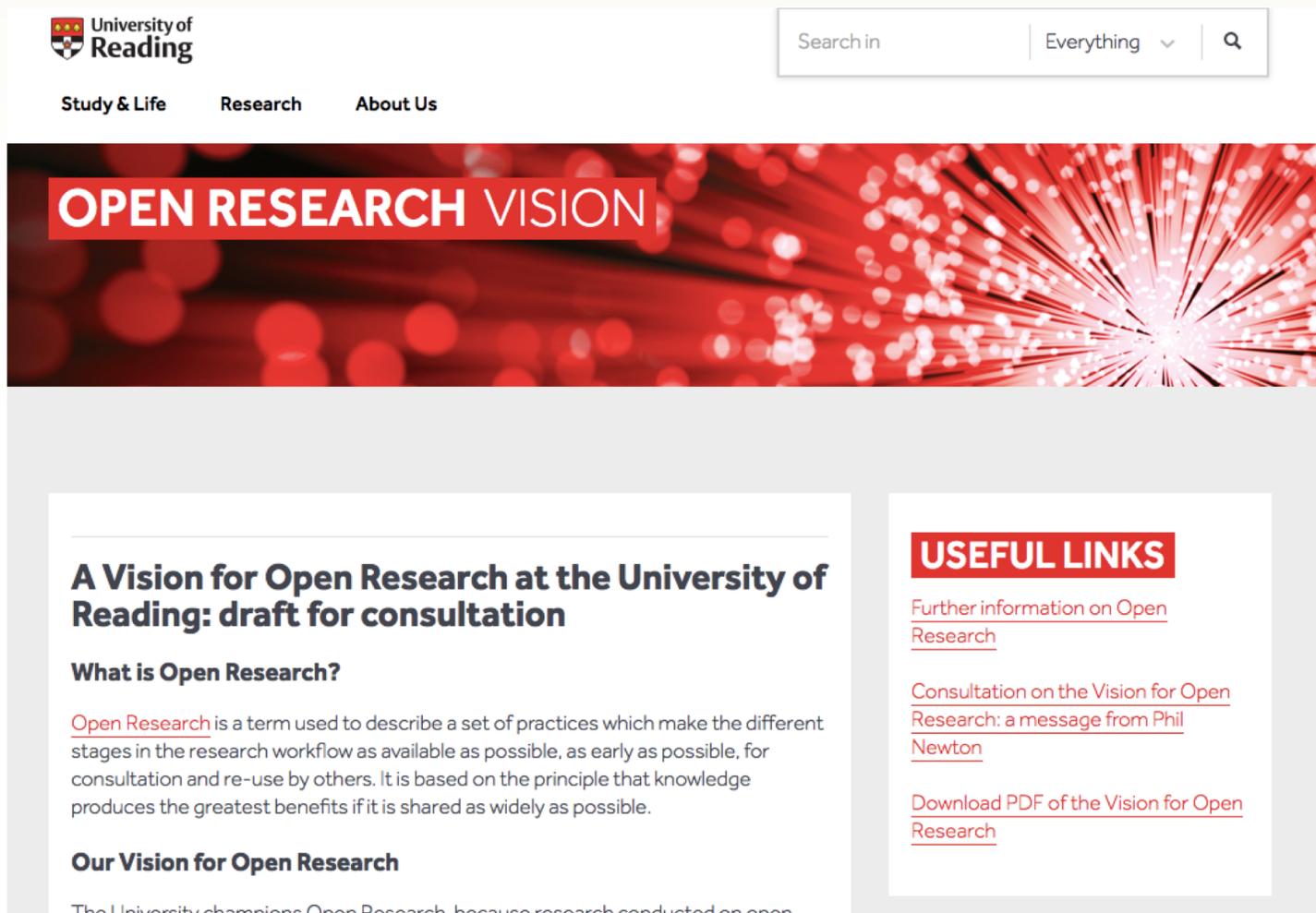
"Utrecht University aims to operate at the forefront of Open Science."

The University Strategic Plan 2016-2020

<https://www.uu.nl/en/organisation/strategic-plan-2016-2020>



University of Reading's 'vision statement'



The screenshot shows the University of Reading website header with the logo, navigation links for 'Study & Life', 'Research', and 'About Us', and a search bar. Below the header is a large red banner with the text 'OPEN RESEARCH VISION'. The main content area is divided into two columns. The left column features a section titled 'A Vision for Open Research at the University of Reading: draft for consultation' with a sub-section 'What is Open Research?' and a paragraph explaining the concept. The right column is titled 'USEFUL LINKS' and contains three links: 'Further information on Open Research', 'Consultation on the Vision for Open Research: a message from Phil Newton', and 'Download PDF of the Vision for Open Research'.

University of Reading

Search in Everything

Study & Life Research About Us

OPEN RESEARCH VISION

A Vision for Open Research at the University of Reading: draft for consultation

What is Open Research?

Open Research is a term used to describe a set of practices which make the different stages in the research workflow as available as possible, as early as possible, for consultation and re-use by others. It is based on the principle that knowledge produces the greatest benefits if it is shared as widely as possible.

Our Vision for Open Research

The University champions Open Research because research conducted on open

USEFUL LINKS

[Further information on Open Research](#)

[Consultation on the Vision for Open Research: a message from Phil Newton](#)

[Download PDF of the Vision for Open Research](#)

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

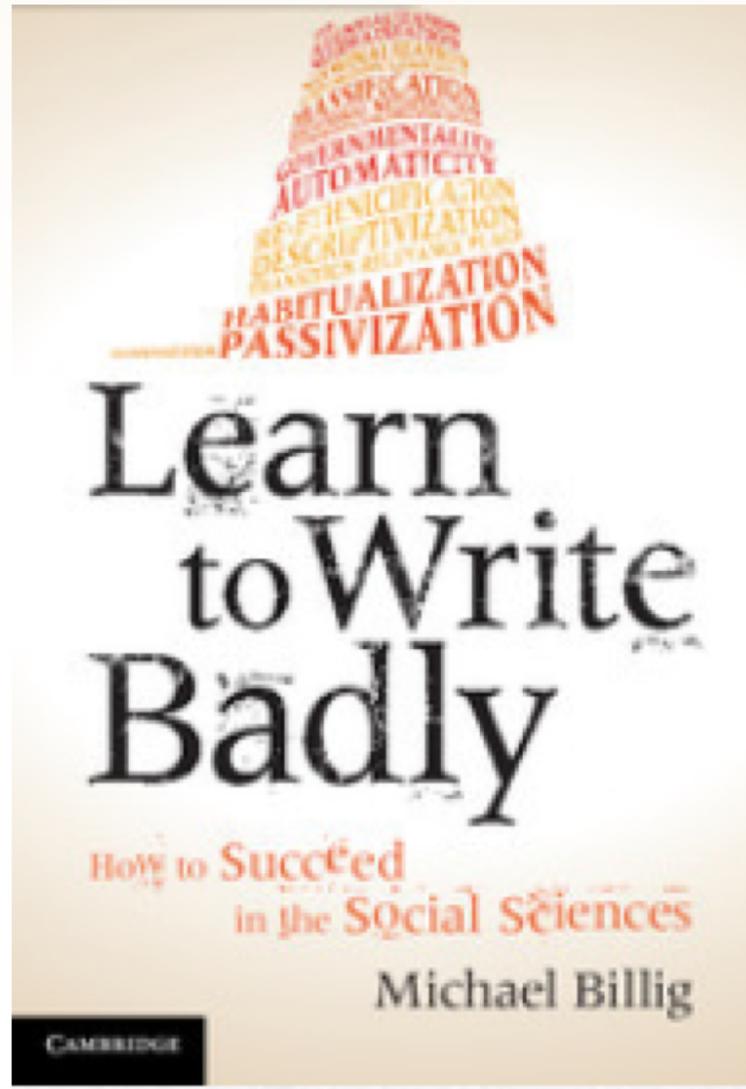


University of Reading

- 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).



Challenge 1 - the language problem



<http://www.cambridge.org/gb/academic/subjects/psychology/social-psychology/learn-write-badly-how-succeed-social-sciences?format=PB#WGOj6Hqgf8fLWujw.97>



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



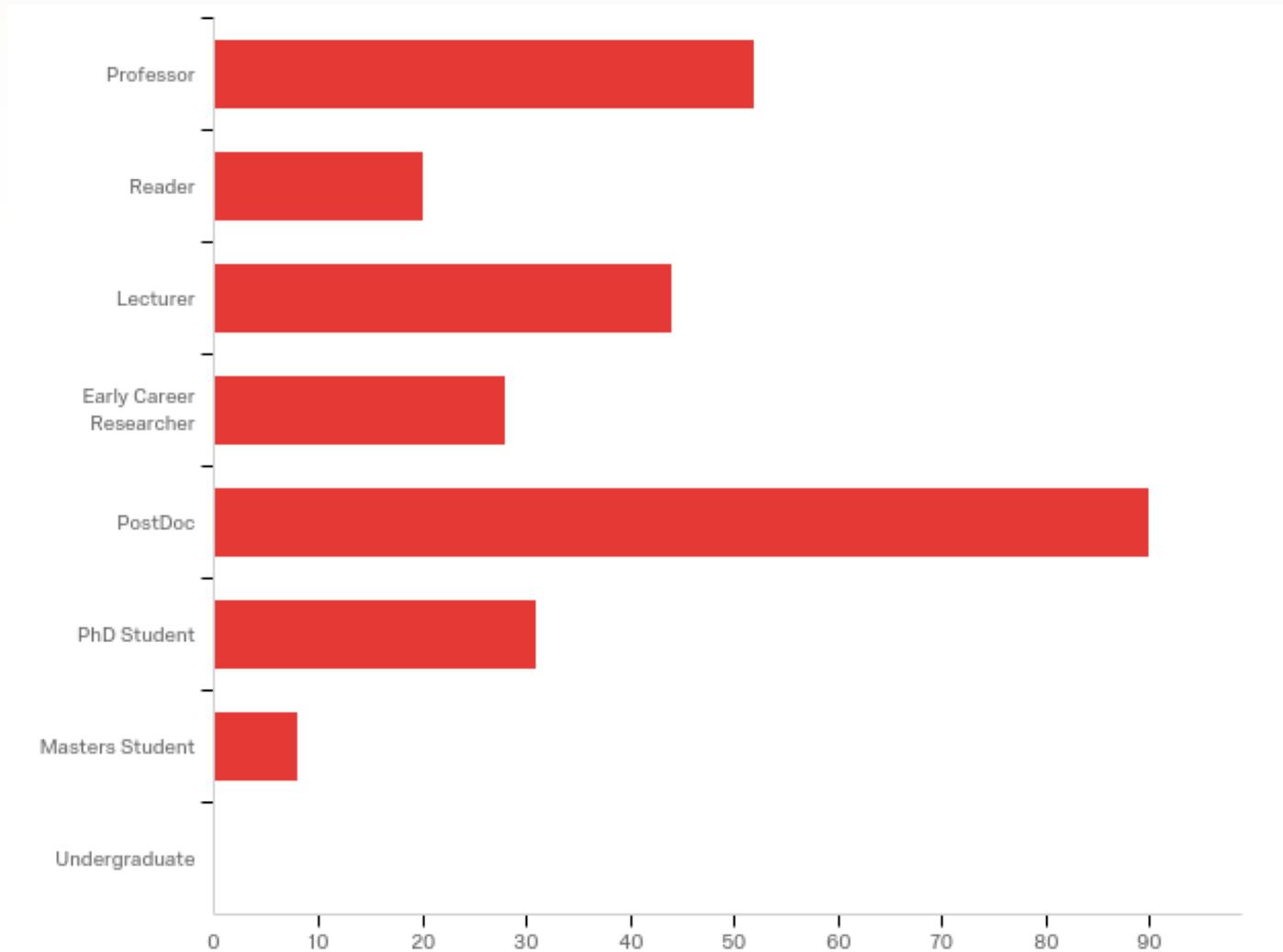
Cambridge survey focused on **Content & Infrastructure**

Development seemed too conceptual

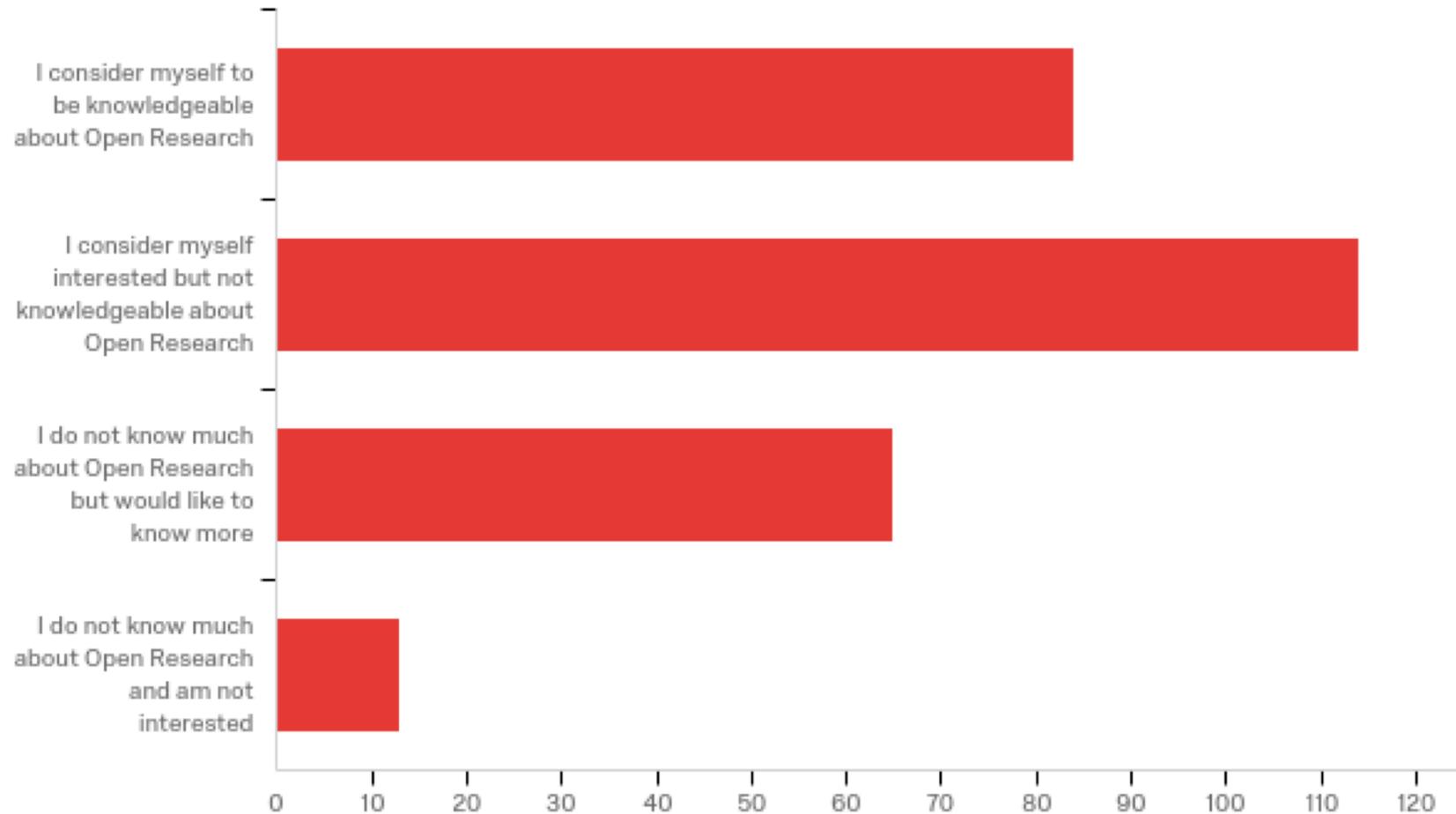
- **Open Content**
 - Open access to research publications (OA)
 - Open data
 - Open educational resources (OER, including open courseware)
 - Open bibliography (also known as open metadata)
 - Open source software (OSS)
- **Open Development**
 - Open development (also known as open development method, 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

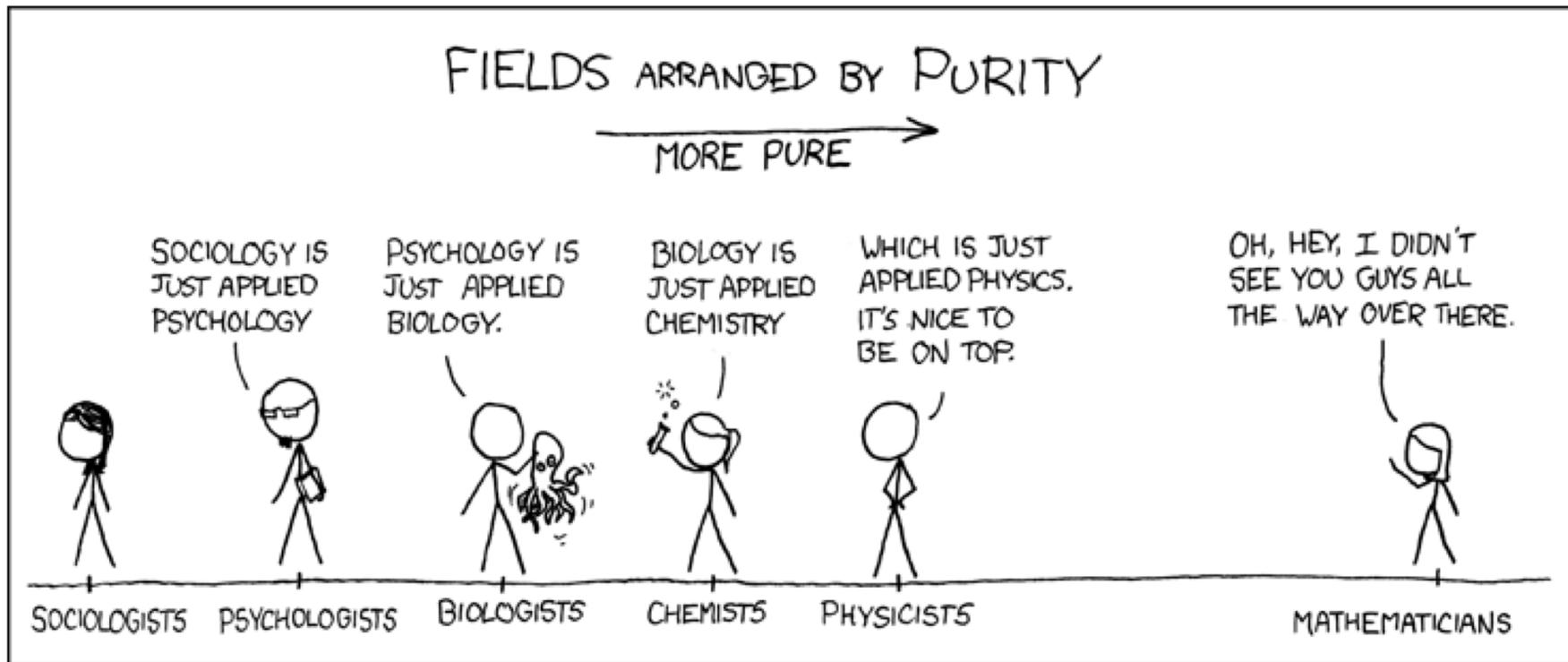


Lack of clarity

- 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’



Challenge 2 - disciplinary differences



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

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>



Challenge 3 - broader issues

Support The Guardian | Subscribe | Find a job | Sign in | Search | International edition

News | Opinion | Sport | Culture | Lifestyle | More

Money | Property | Pensions | Savings | Borrowing | Careers

Higher education

University strikes to continue after staff reject pension offer

Union forced to throw out deal reached with employers in attempt to end dispute

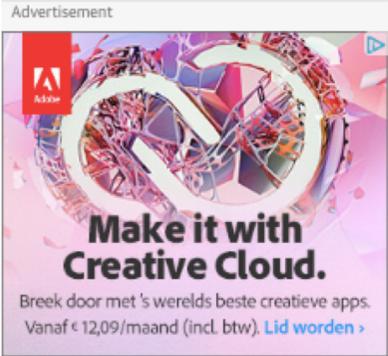
Sally Weale *Education correspondent*
Tue 13 Mar 2018 17:02 GMT

2,972

This article is over 2 months old



Advertisement



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

<https://www.theguardian.com/education/2018/mar/13/striking-university-staff-irate-over-pensions-deal-ucu>

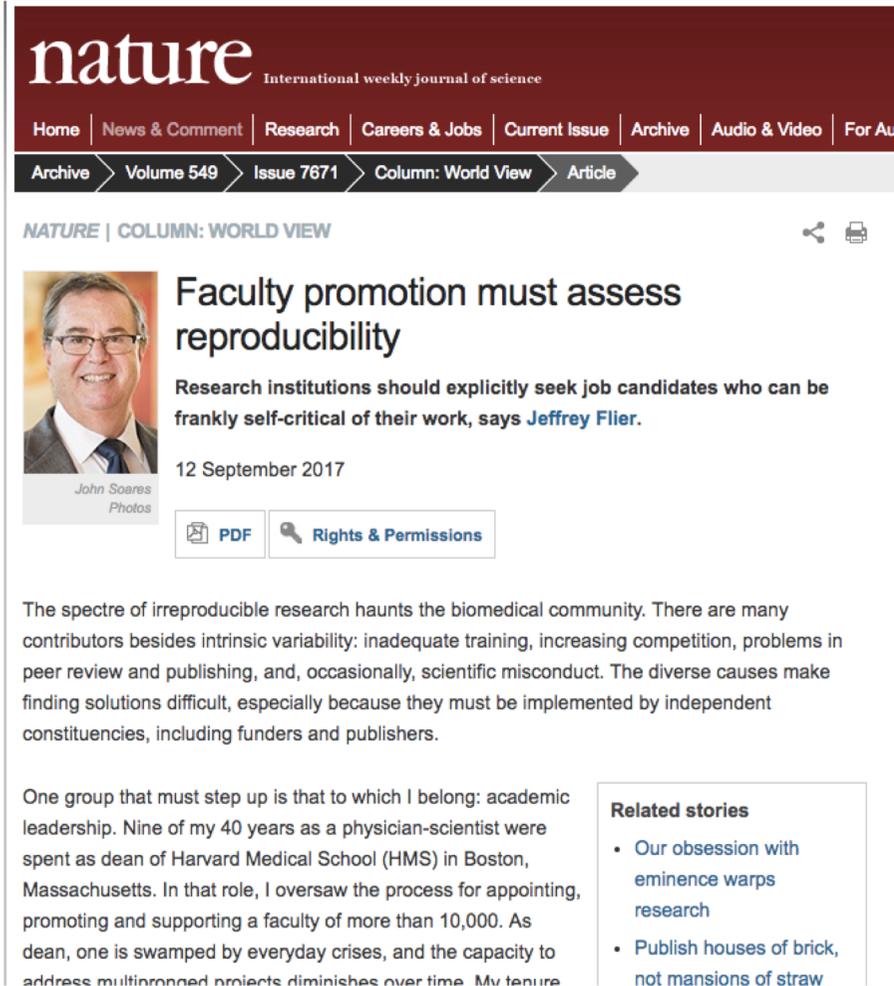


Challenge 4 – need to incentivise



Image: Flickr [Jason Taellious](#) reward – CC-BY-SA 2.0

A call to arms



The screenshot shows the top of a Nature journal article page. The header includes the 'nature' logo and navigation links like 'Home', 'News & Comment', 'Research', etc. The article title is 'Faculty promotion must assess reproducibility' by Jeffrey Flier, dated 12 September 2017. A sub-headline reads: 'Research institutions should explicitly seek job candidates who can be frankly self-critical of their work, says Jeffrey Flier.' Below the title is a photo of John Soares. There are buttons for 'PDF' and 'Rights & Permissions'. The main text begins with 'The spectre of irreproducible research haunts the biomedical community...' and a 'Related stories' box is visible on the right.

- 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>

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



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/>



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



Questions/Discussion

Thanks!

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Cambridge University Library

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