RoRI RESEARCH ON RESEARCH INSTITUTE

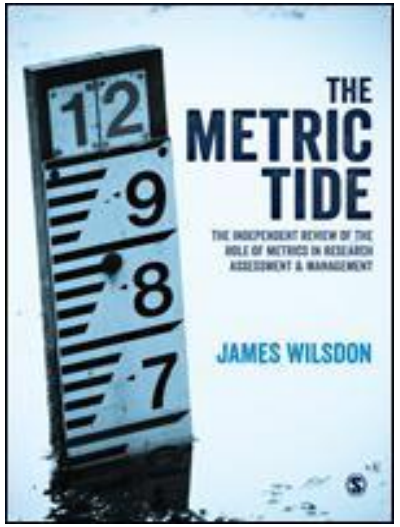
Are we all metascientists now?

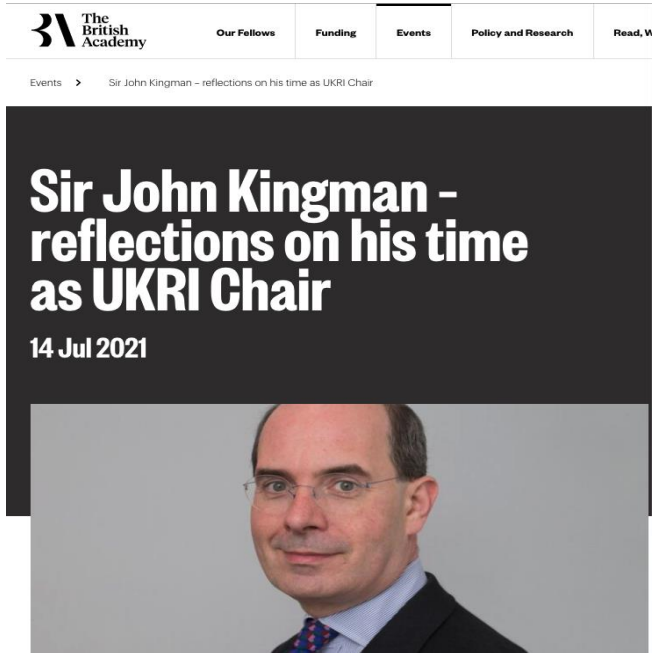
James Wilsdon, RoRI & UCL

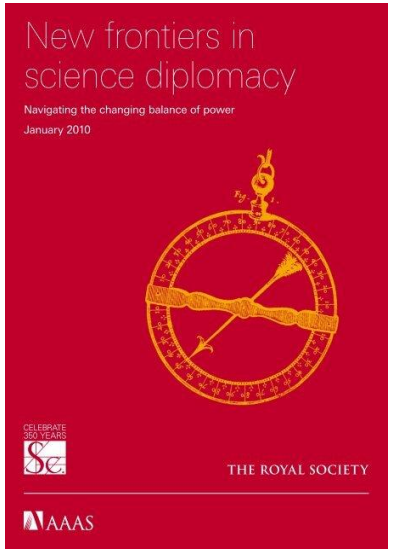
REvaluation 2024, Vienna

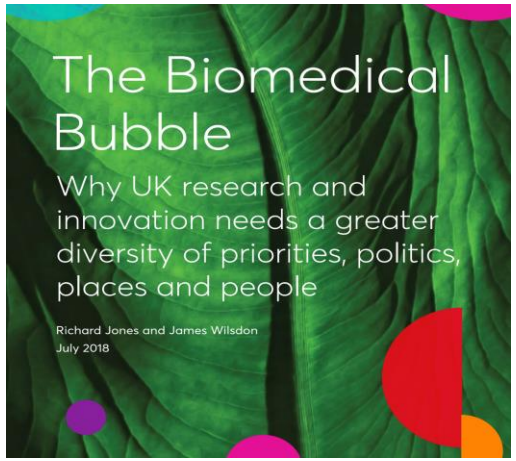
4 Dec 2024

Stumbling into metascience…









"If I look back on many years of involvement in political decision-making and policy-making around science, innovation and R&D, I am struck by how much of it tends to turn on gut feel of the individuals involved, than on hard evidence and analysis. This is ironic, since good science is all about testing hypotheses against data, empirical results and facts….We should, in short, live by our values!"

What I'll aim to cover in ~40 mins:

- Defining metascience (& related terms)
- This metascientific moment
- Why the fresh surge of interest?
- Where RoRI fits in this picture
- 5 priorities for the next 5 years

Are we all metascientists now?

nature

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NATURE INDEX | 07 August 2024

The UK launched a metascience unit. Will other countries follow suit?

Tasked with finding better ways to conduct, distribute and fund research, the unit could set the standard for government-led 'science of science' initiatives.

By Dalmeet Singh Chawla

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Home > UKRI-3994 Metascience: Using Research to Transform Science

UKRI-3994 Metascience: Using Research to Transform Science

UK Research & Innovation
Published date: 11 July 2024

Watch this notice

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Closing: 19 August 2024, 2pm

Closed opportunity - This means that the contract is currently closed. The buying department may be considering suppliers that have already applied, or no suitable offers were made.

Contract summary

Industry

- Research and development services and related consultancy services - 73000000

Funding opportunity

UKRI Metascience research

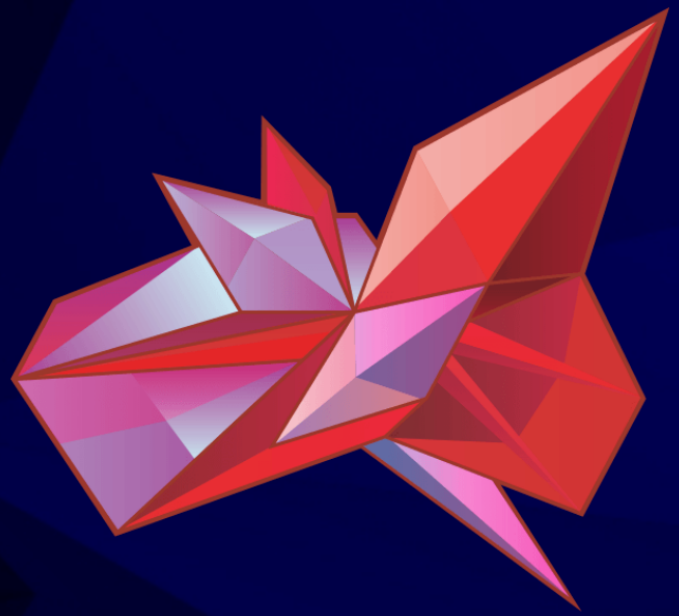
Opportunity status:	Open
Funders:	Economic and Social Research Council (ESRC), Arts and Humanities Research Council (AHRC), Biotechnology and Biological Sciences Research Council (BBSRC), Engineering and Physical Sciences Research Council (EPSRC), Medical Research Council (MRC), Natural Environment Research Council (NERC), Science and Technology Facilities Council (STFC)
Co-funders:	Department for Science, Innovation and Technology (DSIT), Open Philanthropy
Funding type:	Grant
Total fund:	£5,000,000
Maximum award:	£300,000
Publication date:	30 April 2024
Opening date:	30 April 2024 9:00am UK time
Closing date:	16 July 2024 4:00pm UK time

Start application ▶

The Metascience Grants Programme funds cutting-edge research into more effective ways of conducting and supporting Research and Development (R&D). All projects must have the potential to inform science policy, R&D funding practices, or practice within research-performing organisations.

You must be based at a UK research organisation eligible for UK Research and Innovation (UKRI) funding.

The full economic cost (FEC) of your project can be up to £300,000 over a period of s to 24 months. UKRI will fund 80% of the FEC.



METASCIENCE 2025 CONFERENCE

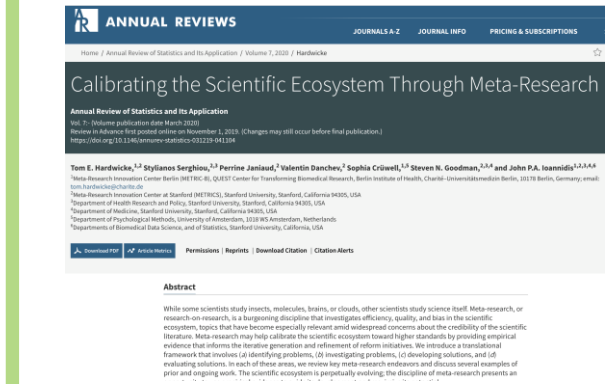
A global gathering for knowledge sharing, community building, and opportunities to define a roadmap of research and intervention priorities to accelerate science.

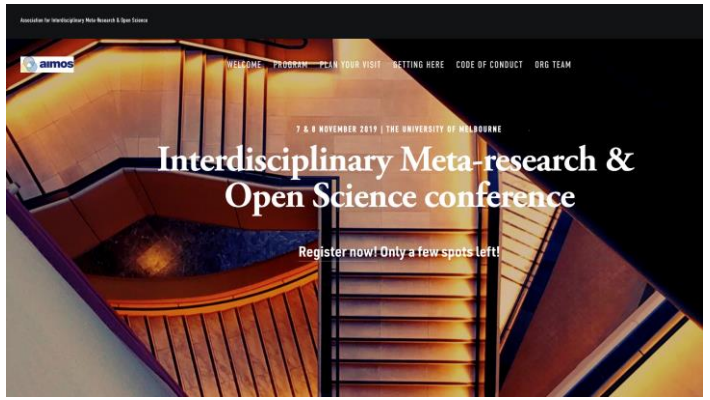
Save the Date

June 30 – July 2, 2025
University College London

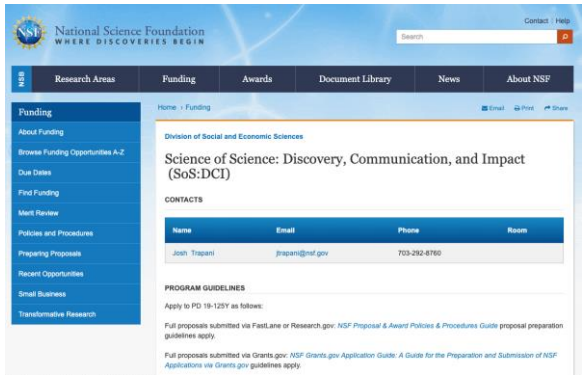
SIGN UP FOR UPDATES

Or meta-researchers?

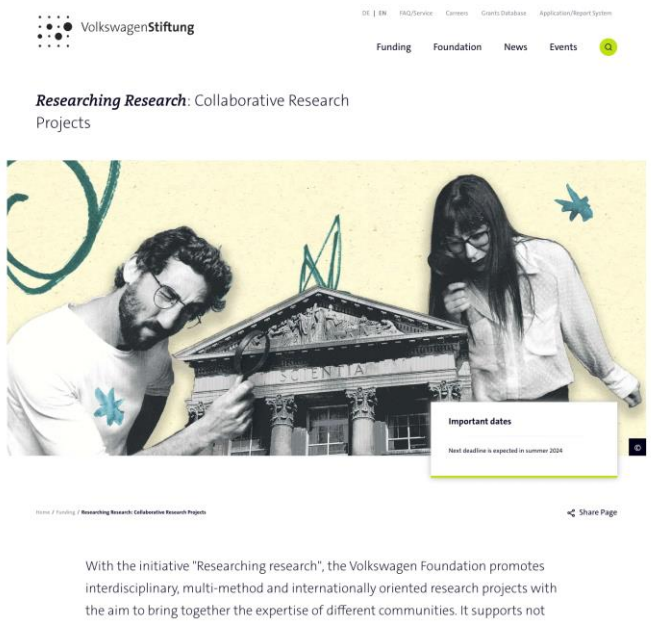


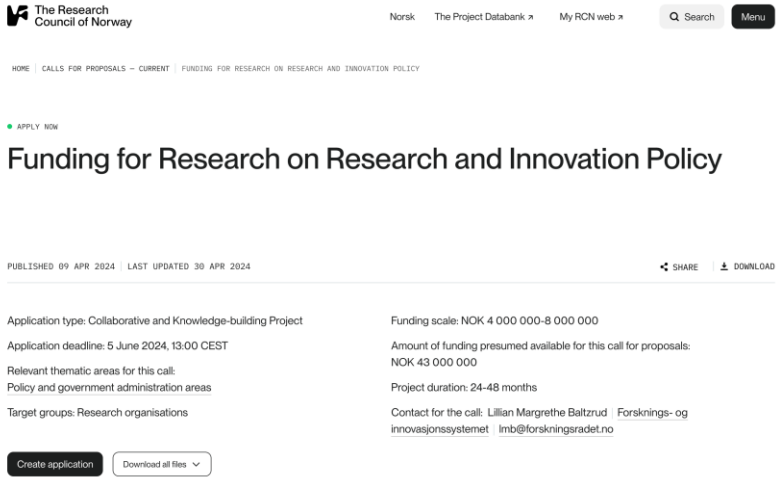


Scientists of science?

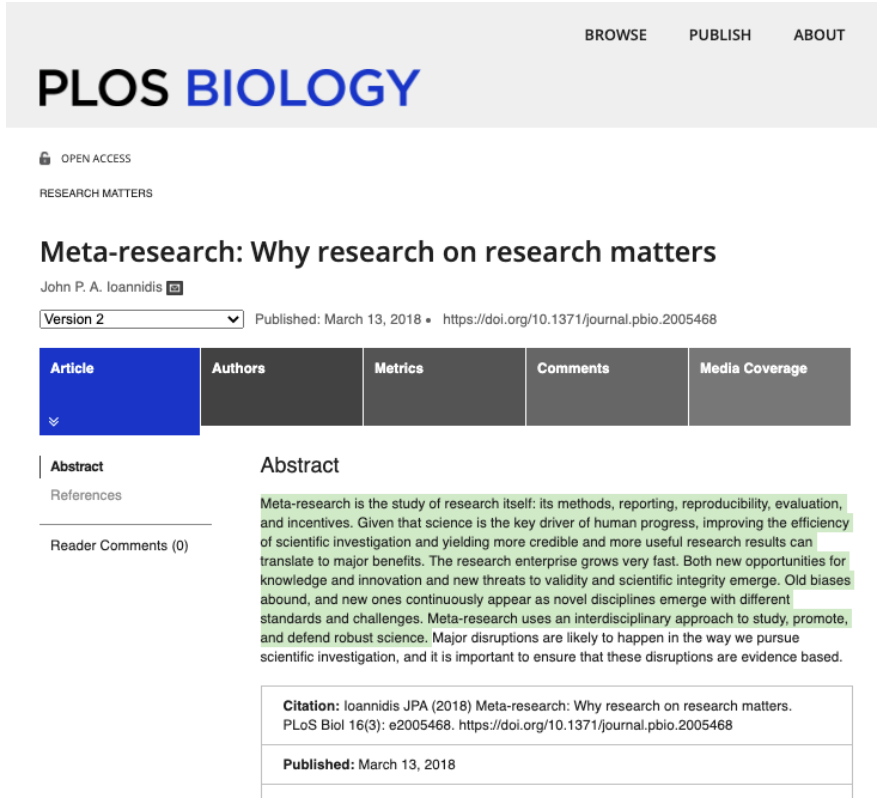


Or researchers on research?





Definitions…. “the science of science itself”



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RESEARCH MATTERS

Meta-research: Why research on research matters

John P. A. Ioannidis

Version 2 Published: March 13, 2018 • https://doi.org/10.1371/journal.pbio.2005468

Article | Authors | Metrics | Comments | Media Coverage

Abstract

References

Reader Comments (0)

Abstract

Meta-research is the study of research itself: its methods, reporting, reproducibility, evaluation, and incentives. Given that science is the key driver of human progress, improving the efficiency of scientific investigation and yielding more credible and more useful research results can translate to major benefits. The research enterprise grows very fast. Both new opportunities for knowledge and innovation and new threats to validity and scientific integrity emerge. Old biases abound, and new ones continuously appear as novel disciplines emerge with different standards and challenges. Meta-research uses an interdisciplinary approach to study, promote, and defend robust science. Major disruptions are likely to happen in the way we pursue scientific investigation, and it is important to ensure that these disruptions are evidence based.

Citation: Ioannidis JPA (2018) Meta-research: Why research on research matters. PLoS Biol 16(3): e2005468. https://doi.org/10.1371/journal.pbio.2005468

Published: March 13, 2018

“Meta-research is the study of research itself: its methods, reporting, reproducibility, evaluation, and incentives…” (Ioannidis et al.)

“Metascience is the scientific investigation of science itself with the aim to improve science…” (Center for Open Science)

“Meta-research involves turning scientific methods back on the science system itself: to analyse and improve the design, management and evaluation of research funding, research cultures and decision-making” (RoRI’s definition)

METASCIENCE 2021 9 24 What is Metascience Part 2 Institutions, Networks and Future Priorities

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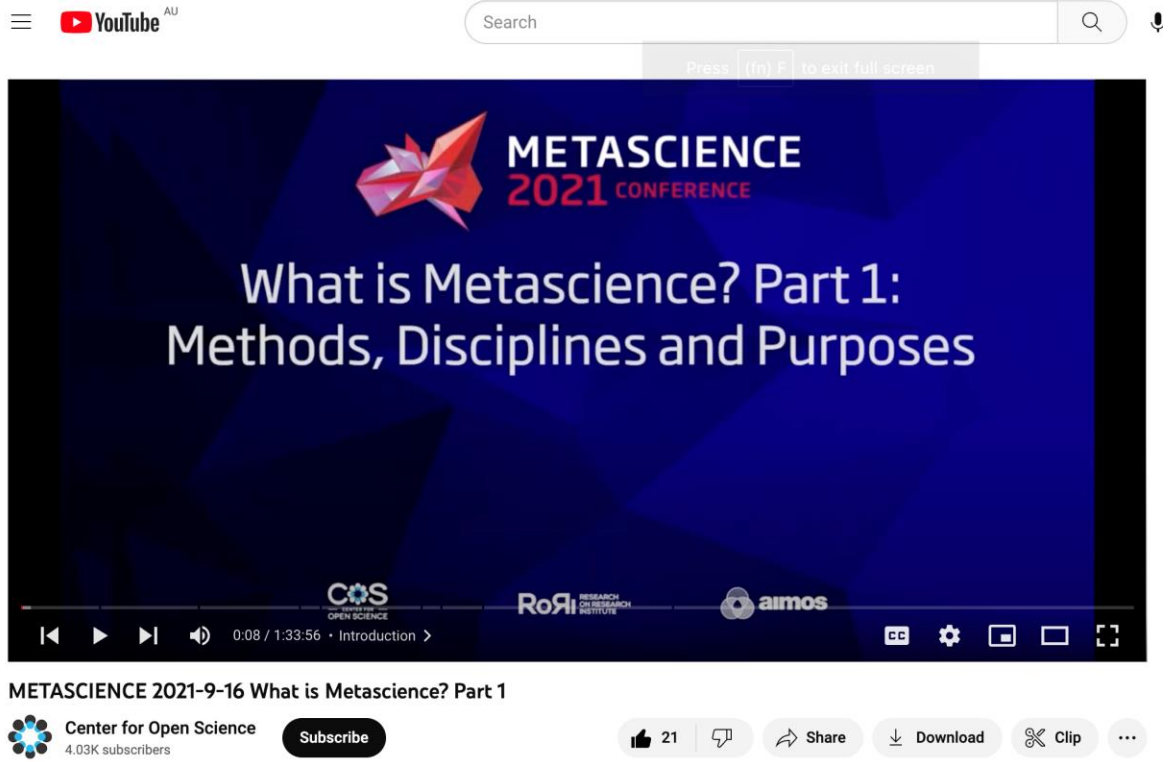

METASCIENCE 2021-9-16 What is Metascience? Part 1

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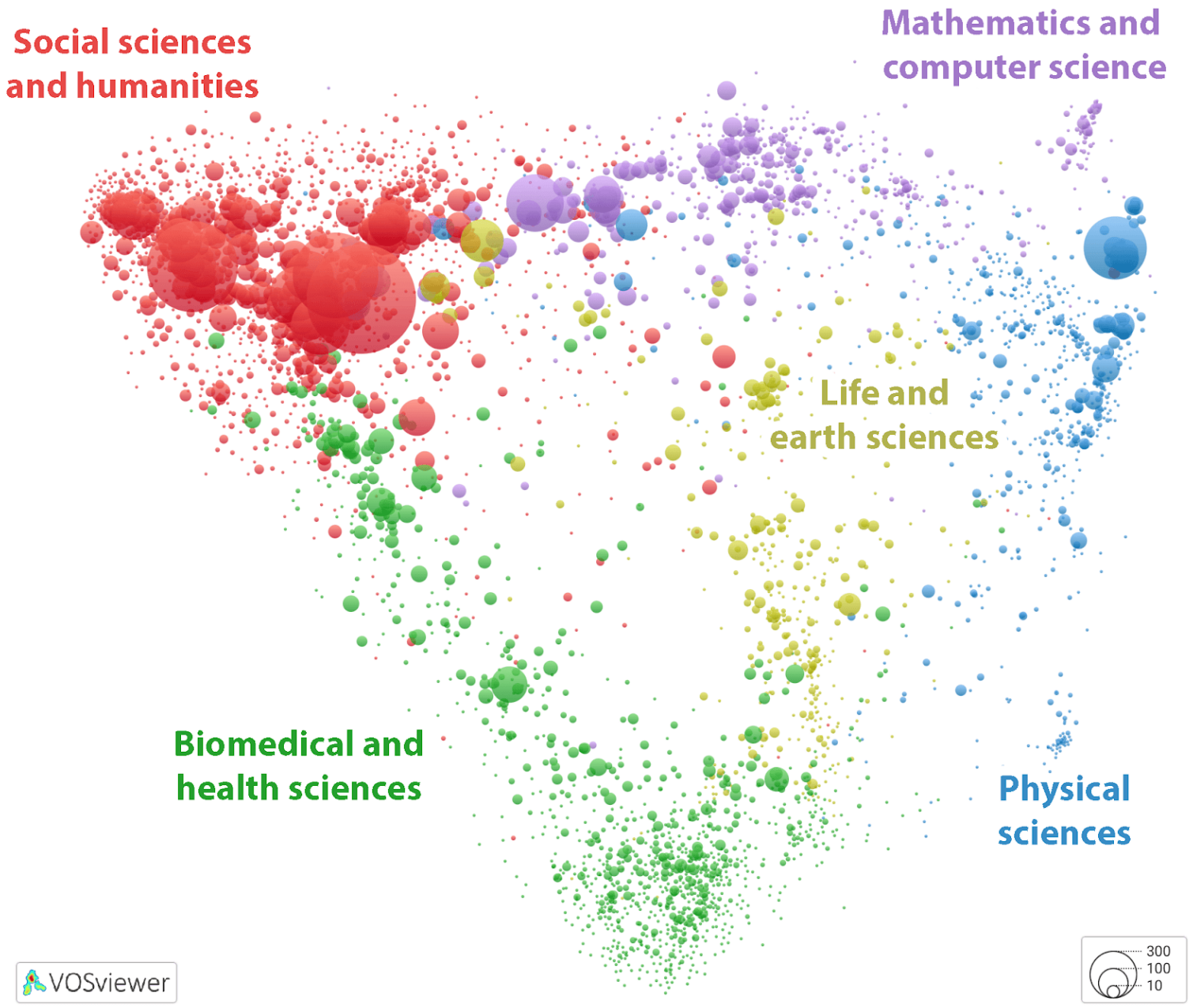
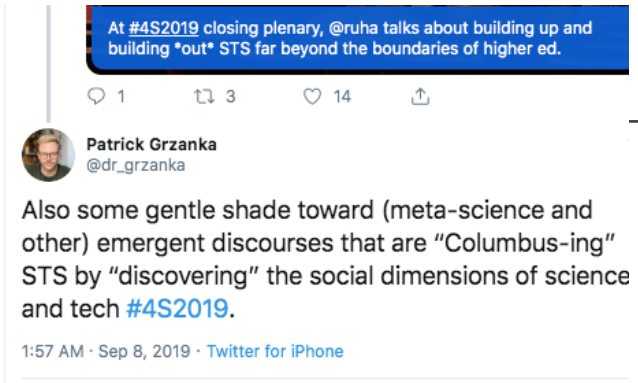
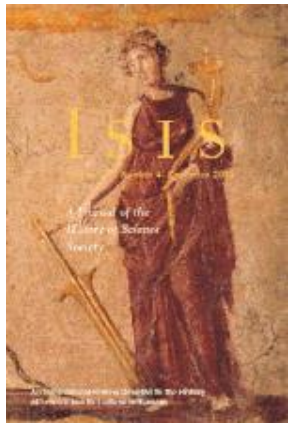
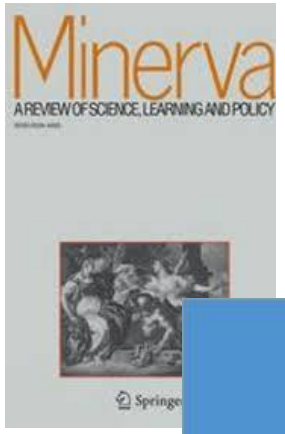
This metascientific moment (1): proliferating, distributed engagement and capability

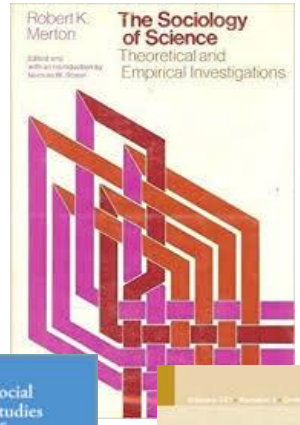


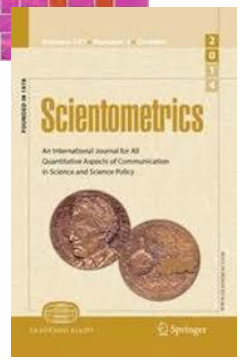
This metascientific moment (2):
more recognition of history & plurality

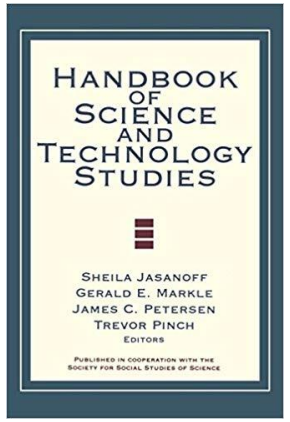


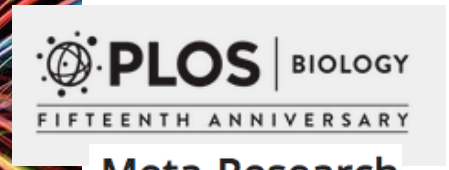












1913 1962 1971 1973 1978 1995 2011 2016 2019

WONKHE

JAMES WILSDON | COMMENT | 27/11/23

Government adoption of metascience can make UK research work better and smarter

The science of science policy is a new priority for government. But, as James Wilsdon explains, it is a mature field and a lot of important work is already under way

wonkhe-science-of-science

For keen observers of the science policy scene, the most eye-catching announcement in last week's government response to Nurse 2.0 (or *The Independent Review of the UK's Research, Development and Innovation Organisational Landscape*, to give its formal title) was the launch of a new metascience unit.

Metascience is not a discipline, but an orientation or mode of engaging with questions and problems that most researchers encounter from time to time in the systems, networks and institutions we inhabit.

These may centre on how we govern, deliver, evaluate or communicate research; how we can make research funding and investment more efficient and effective; how we can expand the diversity of the people and places that contribute to, and benefit from, research; or how we can improve the integrity, rigour and reproducibility of research findings.

Many of us choose at certain points in our career to devote time and energy to such questions, typically as a side hustle to our main work — turning the methods and tools that we've mastered elsewhere back on the research system itself.

Thursday, 15 June

Can AI predict research impacts?

Join this RoRI seminar to debate whether deep content models should replace citations as a basis for science policy and funding?

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RoRI RESEARCH ON RESEARCH INSTITUTE

Article Contents

September 03 2024

The strain on scientific publishing

Mark A. Hanson, Pablo Gómez Barreiro, Paolo Crosetto, Dan Brockington

Quantitative Science Studies 1–29.

https://doi.org/10.1162/qss_a_00327 **Article history**

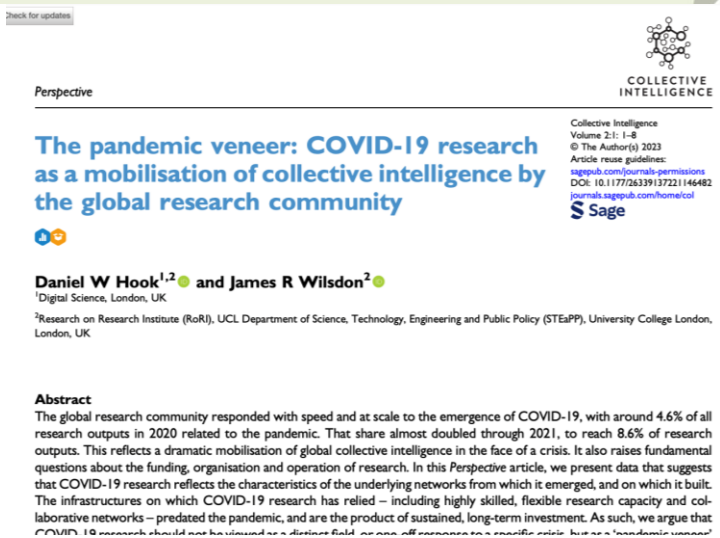
Abstract

Scientists are increasingly overwhelmed by the volume of articles being published. Total articles indexed in Scopus and Web of Science have grown exponentially in recent years; in 2022 the article total was ~47% higher than in 2016, which has outpaced the limited growth – if any – in the number of practising scientists. Thus, publication workload per scientist has increased dramatically. We define this problem as “the strain on scientific publishing.” To analyse this strain, we present five data-driven metrics showing publisher growth, processing times, and citation behaviours. We draw these data from web scrapes, and from publishers through their websites or upon request. Specific groups have disproportionately grown in their articles published per year, contributing to this strain. Some publishers enabled this growth by hosting “special issues” with reduced turnaround times. Given pressures on researchers to “publish or perish” to compete for funding, this strain was likely amplified by these offers to publish more articles. We also observed widespread year-over-year inflation of journal impact factors coinciding with this strain, which risks confusing quality signals. Such exponential growth cannot be sustained. The metrics we define here should enable this evolving 32 conversation to reach actionable solutions to address

This metascientific moment (3): fresh engagement by governments & funders in the potential for evidence-informed STI policy & strategy

Strategic Intelligence

"useable knowledge that supports policy makers in understanding the relevant aspects and scope of the impacts of science, technology and innovation, and their potential future developments"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Perspective

COLLECTIVE INTELLIGENCE

The pandemic veneer: COVID-19 research as a mobilisation of collective intelligence by the global research community

Collective Intelligence
Volume 2:1: 1–8

DOI: 10.1177/26339137221146482
journals.sagepub.com/home/col
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Daniel W Hook[1,2] and James R Wilsdon[2]
[1]Digital Science, London, UK
[2]Research on Research Institute (RoRI), UCL Department of Science, Technology, Engineering and Public Policy (STEaPP), University College London, London, UK

Abstract
The global research community responded with speed and at scale to the emergence of COVID-19, with around 4.6% of all research outputs in 2020 related to the pandemic. That share almost doubled through 2021, to reach 8.6% of research outputs. This reflects a dramatic mobilisation of global collective intelligence in the face of a crisis. It also raises fundamental questions about the funding, organisation and operation of research. In this *Perspective* article, we present data that suggests that COVID-19 research reflects the characteristics of the underlying networks from which it emerged, and on which it built. The infrastructures on which COVID-19 research has relied – including highly skilled, flexible research capacity and collaborative networks – predated the pandemic, and are the product of sustained, long-term investment. As such, we argue that

Transformative Agenda policy actions on strategic intelligence

- Support novel and **distributed sources** of strategic intelligence to tackle global challenges
- Develop arrangements to **combine different sorts of strategic intelligence** for STI policymaking
- Cultivate skills and capabilities that promote the **utilisation of strategic intelligence** in STI policymaking
- Implement a **strategic 'policies for evidence' agenda** that promotes the production and use of strategic intelligence for transformative change

The UK: DSIT Metascience Unit, UKRI funding & large-scale experiments

Funding opportunity

UKRI Metascience research grants

Opportunity status:	Open
Funders:	Economic and Social Research Council (ESRC), Arts and Humanities Research Council (AHRC), Biotechnology and Biological Sciences Research Council (BBSRC), Engineering and Physical Sciences Research Council (EPSRC), Medical Research Council (MRC), Natural Environment Research Council (NERC), Science and Technology Facilities Council (STFC)
Co-funders:	Department for Science, Innovation and Technology (DSIT), Open Philanthropy
Funding type:	Grant
Total fund:	£5,000,000
Maximum award:	£300,000
Publication date:	30 April 2024
Opening date:	30 April 2024 9:00am UK time
Closing date:	16 July 2024 4:00pm UK time

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NATURE INDEX | 07 August 2024

The UK launched a metascience unit. Will other countries follow suit?

Tasked with finding better ways to conduct, distribute and fund research, the unit could set the standard for government-led 'science of science' initiatives.

By Dalmeet Singh Chawla

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UKRI-3994 Metascience: Using Research to Transform Science

UK Research & Innovation
Published date: 11 July 2024

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Closing: 19 August 2024, 2pm

Closed opportunity - This means that the contract is currently closed. The buying department may be considering suppliers that have already applied, or no suitable offers were made.

Contract summary

Industry

- Research and development services and related consultancy services - 73000000

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Funding opportunity

Data sandpit for metascience

Opportunity status:	Open
Funders:	UK Research and Innovation, Arts and Humanities Research Council (AHRC), Biotechnology and Biological Sciences Research Council (BBSRC), Economic and Social Research Council (ESRC), Engineering and Physical Sciences Research Council (EPSRC), Innovate UK, Medical Research Council (MRC), Natural Environment Research Council (NERC), Research England, Science and Technology Facilities Council (STFC)
Co-funders:	Department for Science, Innovation and Technology
Funding type:	Grant
Total fund:	£1,000,000
Publication date:	17 October 2024
Opening date:	17 October 2024 9:00am UK time
Closing date:	21 November 2024 4:00pm UK time

RoRI RESEARCH ON RESEARCH INSTITUTE

Canada: new multi-agency funding call

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- Upcoming Deadlines

Research on Research Joint Initiative

2024-25 competition

A joint initiative of SSHRC, CIHR, and Michael Smith Health Research BC

Overview	
Value	Up to $200,000
Duration	3 years
Application deadline *	February 20, 2025

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MAY 16, 2024

Meta-research in Canada

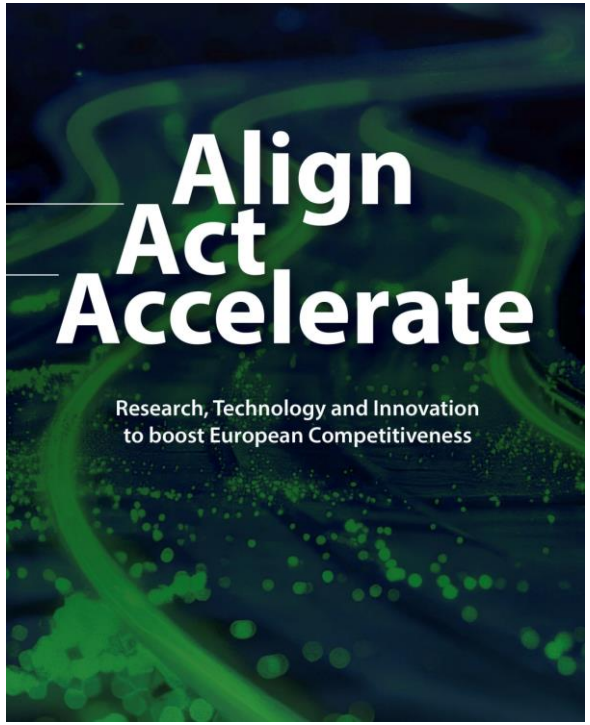
RoRI's James Wilsdon headed to Ottawa for a round of meetings with our partners

RoRI Updates

RoRI has more core partners in Canada than in any other country: **CIHR**, **SSHRC** and **Health Research BC** are all active in the consortium.

In April 2024, James Wilsdon, RoRI's executive director, headed to Ottawa for a round of meetings with our partners to discuss live plans and projects, and to explore how RoRI can support efforts to build meta-research capacity and connections across the Canadian R&D system.

European Union: push for more experimentation at heart of next EU Framework Programme (FP10)



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News

European research funding is set to change

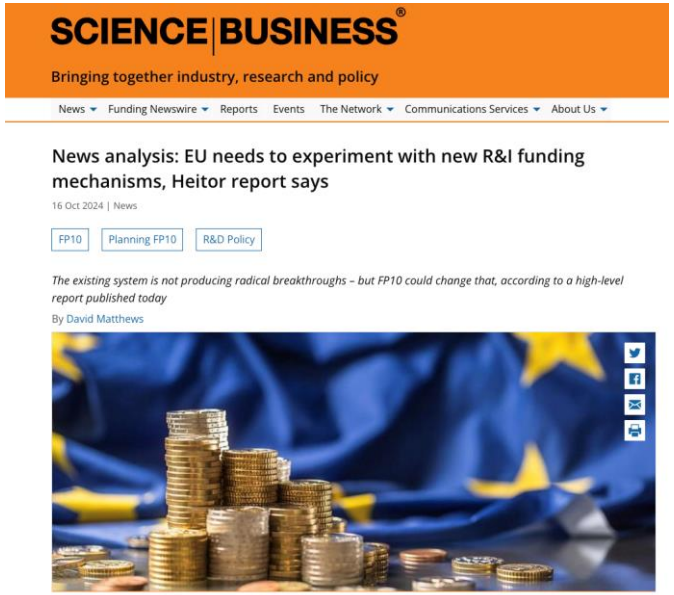
17 October 2024

In view of current discussions in Brussels, FORWIT is calling on the Austrian government to play an active role in shaping European research and innovation policy.

A report published yesterday by the expert group on the interim evaluation of the 'Horizon Europe' research framework programme provides new material for discussion in the shaping of European research and innovation policy. The so-called Heitor Report confirms the relevance and effectiveness of the framework programme for research and innovation in Europe. At the same time, it calls for necessary reforms. 'I see many sensible proposals for the further development of the framework programme in the Heitor report,' says Helga Nowotny, member of the Council for Research, Science, Innovation and Technology Development (FORWIT).

However, the report comes at a time when rumours of fundamental changes to the EU budget are intensifying, which could also have an impact on research and innovation policy. 'It is positive that Ursula von der Leyen has recognised the seriousness of the situation in which Europe finds itself. The project of European integration needs more focus, more decision-making power,' says Thomas Henzinger, Chairman of FORWIT. However: 'The EU's research and innovation policy instruments work comparatively well. They must not become collateral damage in the planned reforms.'

I see many sensible proposals for the further development of the framework programme in the Heitor report.
Helga Nowotny



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News analysis: EU needs to experiment with new R&I funding mechanisms, Heitor report says

16 Oct 2024 | News

FP10 Planning FP10 R&D Policy

The existing system is not producing radical breakthroughs – but FP10 could change that, according to a high-level report published today

By David Matthews

“Disruptive, paradigm shifting research and innovation…is unlikely to be fostered by conventional procedures and programmes… prevalent in the EU today”. The EU should “immediately” establish an “experiment unit” to test out “new programmes, evaluation procedures and instruments.” **Heitor Report, Oct 2024**

China: renewed policy & funder investment & engagement in science of science

上海市科学学研究所 SHANGHAI INSTITUTE FOR SCIENCE OF SCIENCE 格物致知 咨政益世

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"Pujiang Innovation Forum - 2024 International Science, Technology and Innovation Think Tank Forum" held in Shanghai

2024-06-12

"Pujiang Innovation Forum - 2024 International Science, Technology and Innovation Think Tank Forum" was held in Shanghai from May 30 to 31, 2024. The forum was jointly hosted by Shanghai Institute for Science of Science, under the guidance of the Science and Technology Commission of Shanghai Municipality and the Chinese Academy of Science and Technology for Development. He Defang, Counselor of the State Council, and Shang Yuying, Deputy Secretary-General of the Shanghai Municipal Government, attended the opening ceremony and delivered speeches. The ceremony was chaired by Zhu Qigao, Deputy Director and First-Class Inspector of the Science and Technology Commission of Shanghai Municipality. Distinguished scientists from top domestic and foreign think tanks on technological innovation, as well as policy-making experts, came together to discuss and exchange views on the core topic of "the Science of Science in the New Era," with more than 320 expert representatives participating in the conference.

《科学学上海倡议》发布丨浦江创新论坛——2024科技创新智库国际研讨会

Original 三思派 三思派 2024年05月30日 14:25

2024年5月30上午，“浦江创新论坛——2024科技创新智库国际研讨会”在上海开幕。会上，上海市科学学研究所联合参会嘉宾共同发布了《科学学上海倡议》，伦敦大学学院 James Wilsdon 教授代表全体签署人宣读了倡议，旨在推动科学学的与时俱进、咨政益世和合作共享。以下是宣言全文。

Citation: LI Xiaoxuan, XU Fang. How to Break the “Siwei”?—Practice and Enlightenment Based on Research Institute Evaluation of Chinese Academy of Sciences [J]. Bulletin of Chinese Academy of Sciences, 2020 (12): 1431–1438.

How to Break the “Siwei”?—Practice and Enlightenment Based on Research Institute Evaluation of Chinese Academy of Sciences

LI Xiaoxuan[1,2], XU Fang[1,2]

1. Institutes of Science and Development, Chinese Academy of Sciences, Beijing 100190, China;
2. School of Public Policy and Management, University of Chinese Academy of Sciences, Beijing 100049, China

Abstract: In October 2018, five ministries and institutions, i.e., Ministry of Science and Technology, Ministry of Education, Ministry of Human Resources and Social Security, Chinese Academy of Sciences (CAS), and Chinese Academy of Engineering, collaboratively started the special action of breaking “Siwei,” which means “Four-Only” problems, i.e., only papers, only titles, only education background, and only awards. Most researchers in universities and research institutions have both expectations and concerns. There are different opinions on how to break the “Siwei.” On the basis of the analysis of the development of evaluation conducted by CAS for more than 20 years, this study holds the view that CAS has explored a way of breaking the “Siwei” and formed the CAS mode in research institute evaluation, which is expected to provide a case for reference on how to break the “Siwei.”
DOI: 10.16418/j.issn.1000-3045.20201116002-en

Keywords: break the “Siwei”; Chinese Academy of Sciences; research institute evaluation; CAS mode; science evaluation

Over the years, science evaluation, particularly in the basic research, has been a hot topic in the scientific and techno- indicators should be added. As affected by various opinions, the breaking of the “Siwei” has almost fallen in a dilemma

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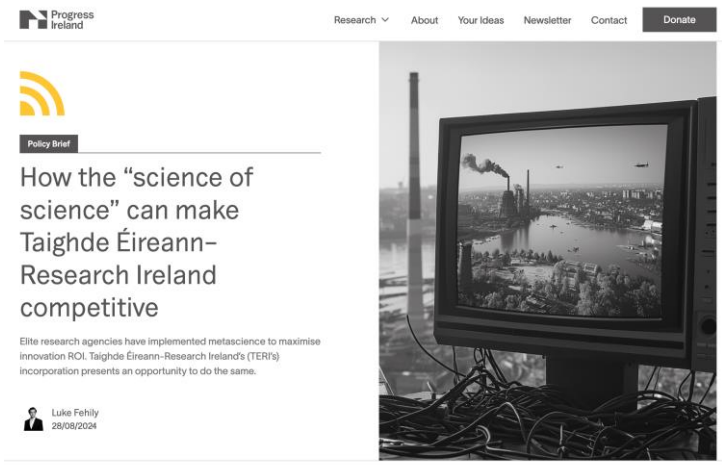
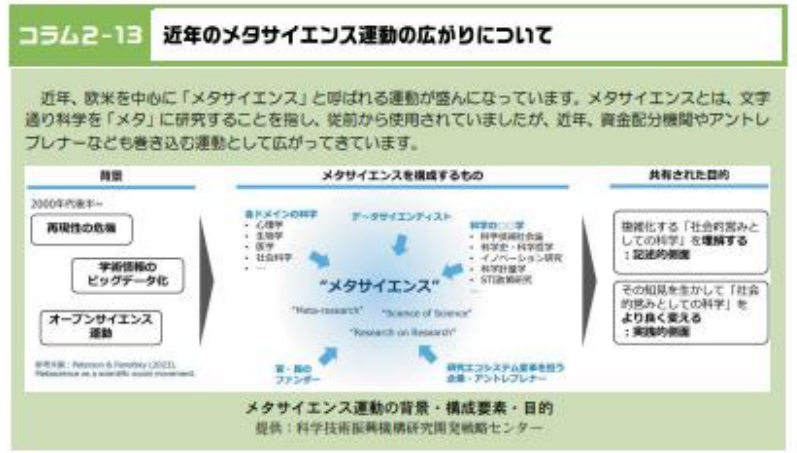
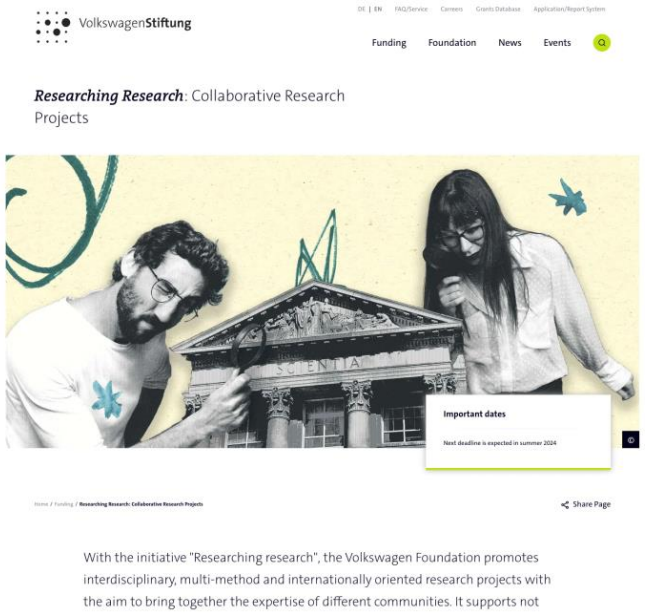
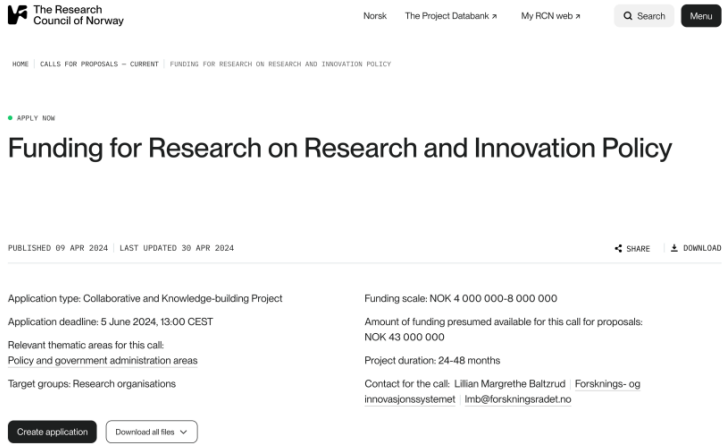
Ireland, Germany, Japan, Norway etc









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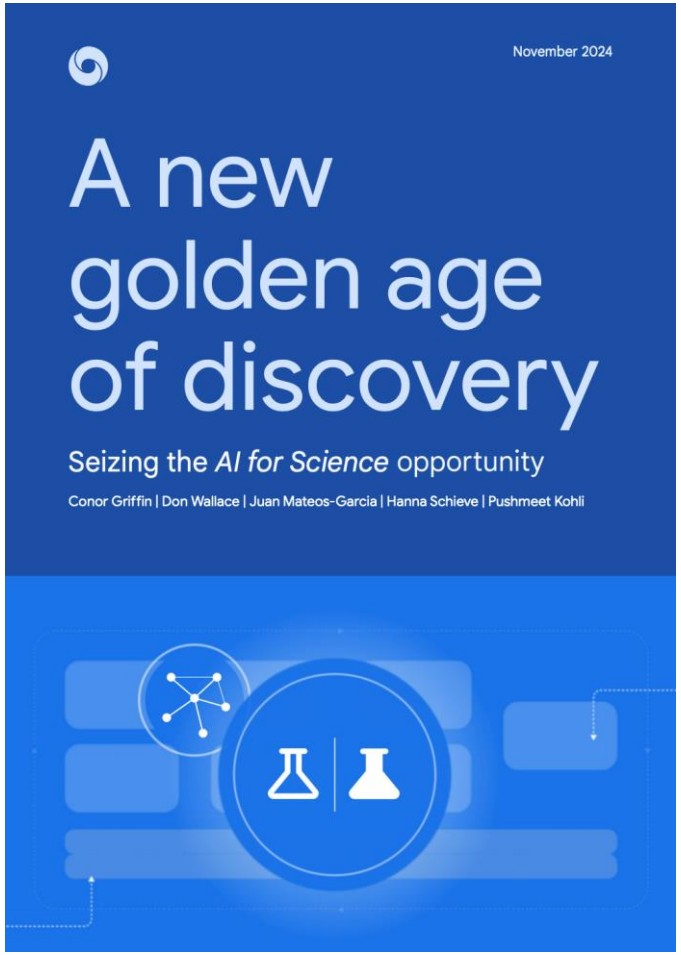
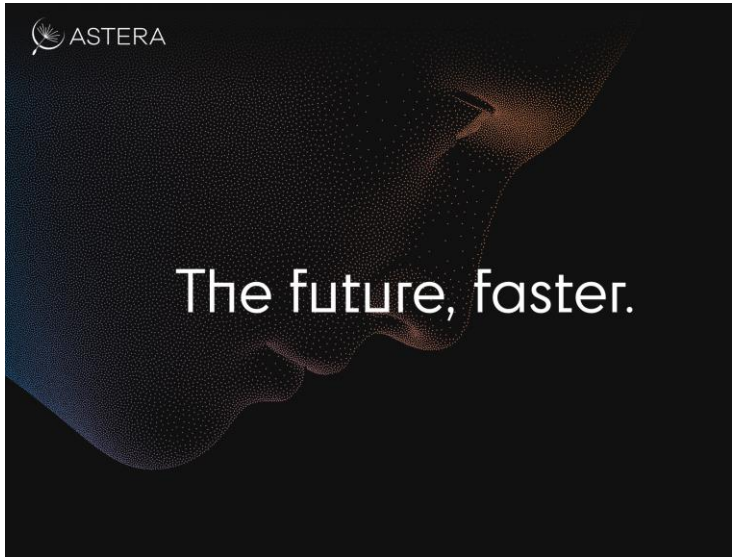
This metascientific moment (4): engagement of new institutions & sectors



4. Build evidence and experiment with new ways of organising science

Scientists' use of AI is growing exponentially, but policymakers have little evidence about who is doing it best, how they are doing it, and the hurdles that are inhibiting others. This evidence gap is an impediment to identifying the best AI for Science policy ideas and targeting them effectively. Historically, answers to such questions often come from fields such as economics or innovation studies, but the results can take years to arrive. We are using citation data analysis, interviews, and community engagement to understand how scientists are using our AI models. Governments are also investing in these *metascience* capabilities to improve how they fund, share and evaluate science research. Building on this momentum, scientists could be tasked with a mission to rapidly assess foundational policy questions, including: where is the most impactful AI for Science research occurring and what types of organisations, talent, datasets, and evaluations are enabling it? To what extent are scientists using and fine-tuning LLMs vs more specialised AI models, and how are they accessing these models? To what extent is AI *actually* benefiting or harming scientific creativity, reliability, the environment, or other domains? How is AI affecting a scientist's perception of their job and what skills, knowledge gaps, or other barriers are preventing their broader use of AI?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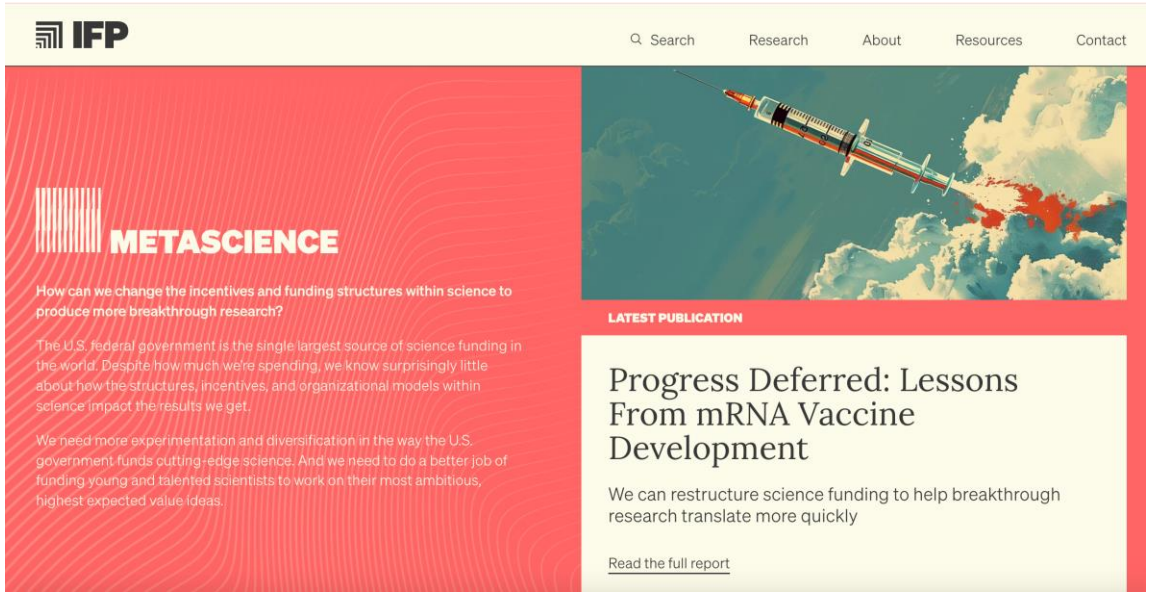
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How can we change the incentives and funding structures within science to produce more breakthrough research?
The U.S. federal government is the single largest source of science funding in the world. Despite how much we're spending, we know surprisingly little about how the structures, incentives, and organizational models within science impact the results we get.
We need more experimentation and diversification in the way the U.S. government funds cutting-edge science. And we need to do a better job of funding young and talented scientists to work on their most ambitious, highest expected value ideas.
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We can restructure science funding to help breakthrough research translate more quickly
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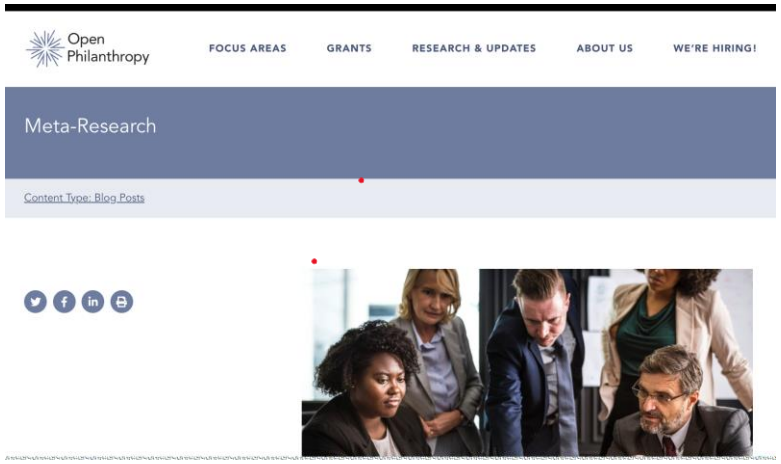
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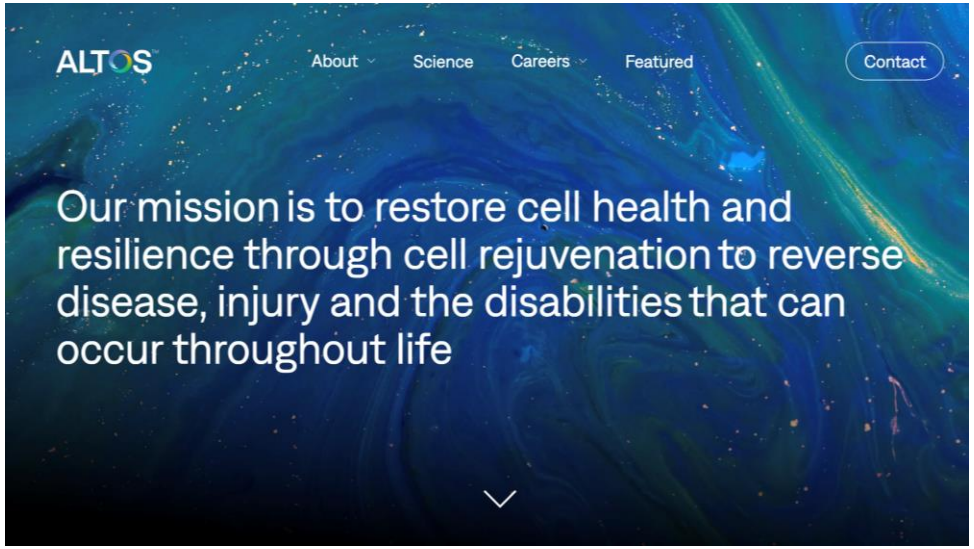
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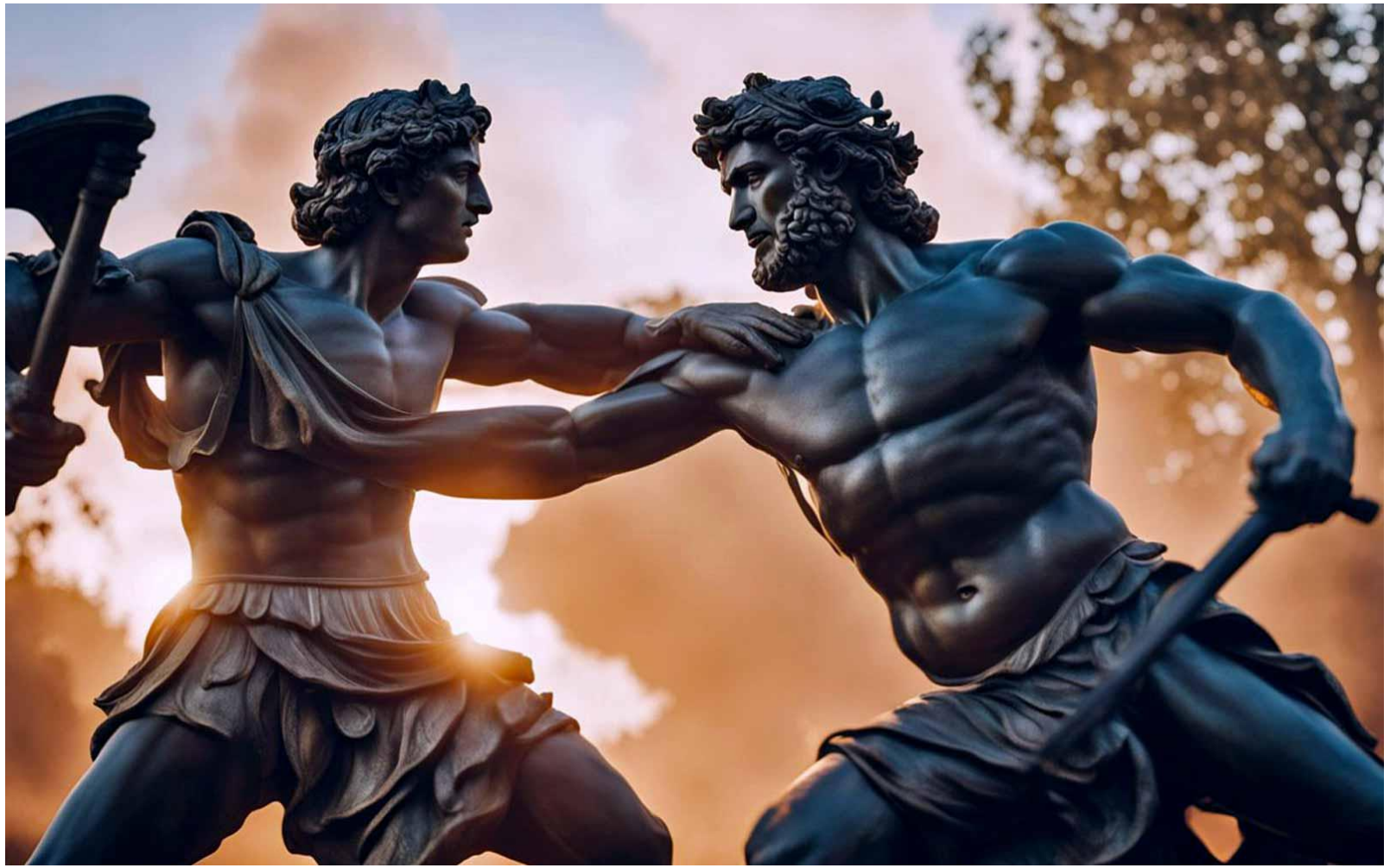
Our mission is to restore cell health and resilience through cell rejuvenation to reverse disease, injury and the disabilities that can occur throughout life

Appollonian vs. Dionysian metascience? (thanks to Stian Westlake)



A Vision of Metascience

An Engine of Improvement for the Social Processes of Science

By Michael Nielsen and Kanjun Qiu
October 18, 2022

How does the culture of science change and improve? Many people have identified shortcomings in core social processes of science, such as peer review, how grants are awarded, how people are selected to become scientists, and so on. Yet despite often compelling criticisms, strong barriers inhibit widespread change in such social processes. The result is near stasis, and apathy about the prospects for improvement. People sometimes start new research institutions intended to do things differently; unfortunately such

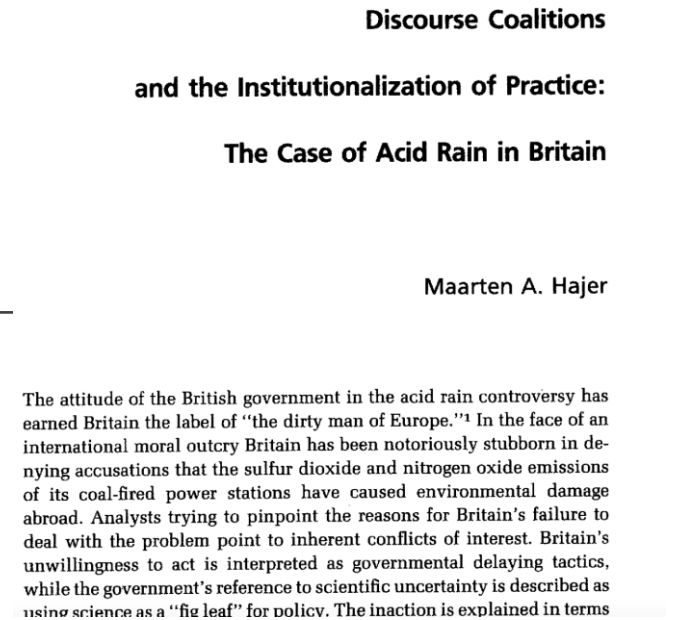
may be rapidly improved. In this vision, metascience plays a key role: it

How much of this is new..?

New methods: of course building on existing disciplinary & methodological strengths, then supplementing these with larger datasets, new metrics and now AI tools and techniques;

New actors: metascience draws in researchers from across the disciplinary landscape, but also those in funding agencies, government ministries, R&D-based firms, private labs and foundations – all of whom have an interest and stake in strengthening the ways we manage, fund and evaluate R&D;

New coalitions: we can see metascience bringing together interests, stakeholders and participants in a way that can be unexpected and effective. A mix of instrumental and normative.



Discourse Coalitions

and the Institutionalization of Practice:

The Case of Acid Rain in Britain

Maarten A. Hajer

The attitude of the British government in the acid rain controversy has earned Britain the label of "the dirty man of Europe."[1] In the face of an international moral outcry Britain has been notoriously stubborn in denying accusations that the sulfur dioxide and nitrogen oxide emissions of its coal-fired power stations have caused environmental damage abroad. Analysts trying to pinpoint the reasons for Britain's failure to deal with the problem point to inherent conflicts of interest. Britain's unwillingness to act is interpreted as governmental delaying tactics, while the government's reference to scientific uncertainty is described as using science as a "fig leaf" for policy. The inaction is explained in terms

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Citation: Rushforth, A., & Hammarfelt, B. (2023). The rise of responsible metrics as a professional reform movement: A collective action frames account. *Quantitative Science Studies*, *4*(4), 879–897. https://doi.org/10.1162/qss_a_00280

DOI: https://doi.org/10.1162/qss_a_00280

Peer Review: https://www.webofscience.com/api/gateway/wos/peer-review/10.1162/qss_a_00280

Supporting Information: https://doi.org/10.1162/qss_a_00280

Received: 9 December 2022
Accepted: 26 September 2023

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REVIEW ARTICLE

The rise of responsible metrics as a professional reform movement: A collective action frames account

Alexander Rushforth[1] and Björn Hammarfelt[2]

[1]Centre for Science and Technology Studies (CWTS), Leiden University, Leiden, The Netherlands
[2]Swedish School of Library and Information Science, University of Borås, Borås, Sweden

Keywords: evaluative bibliometrics, research assessment reforms, responsible metrics, responsible research assessment, social movements

ABSTRACT

Recent years have seen a rise in awareness around "responsible metrics" and calls for research assessment reforms internationally. Yet within the field of quantitative science studies and in research policy contexts, concerns about the limitations of evaluative bibliometrics are almost as old as the tools themselves. Given that many of the concerns articulated in recent reform movements go back decades, why has momentum for change grown only in the past 10 years? In this paper, we draw on analytical insights from the sociology of social movements on *collective action frames* to chart the emergence, development, and expansion of "responsible metrics" as a *professional reform movement*. Through reviewing important texts that have shaped reform efforts, we argue that hitherto, three framings have underpinned the responsible metrics reform agenda: the *metrics skepticism* framing, the *professional-expert* framing, and the *reflexivity* framing. We suggest that although these three framings have coexisted within the responsible metrics movement to date, cohabitation between these framings may not last indefinitely, especially as the responsible metrics movement extends into wider research assessment reform movements.

Why are we seeing this surge of interest in metascience?

R&D WORLD

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Global R&D Funding Forecast 2024: Investment set to reach $2.53 trillion, up 8.3%

By R&D World Editorial | July 23, 2024

Home > Economy > Government, public sector and taxes > Research and development expenditure >
Gross domestic expenditure on research and development, UK

Gross domestic expenditure on research and development, UK: 2022

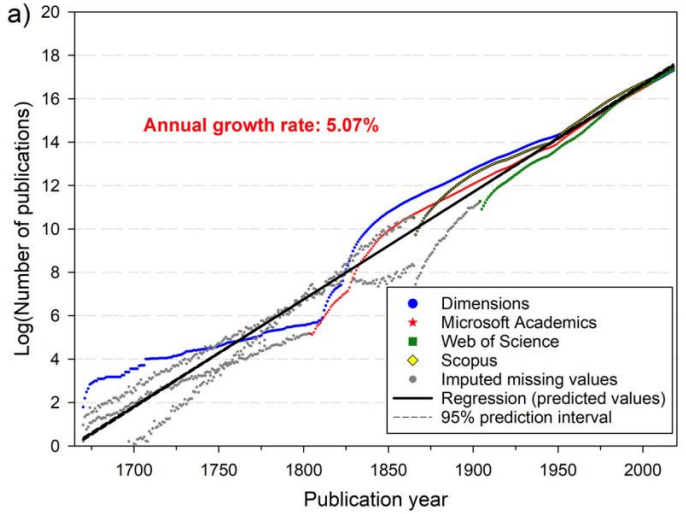
Estimates of research and development performed and funded by businesses, higher education, government, UK Research and Innovation, and non-profit organisations.

This is the latest release. View previous releases

Contact: Research and Development team
Release date: 8 August 2024
Next release: To be announced

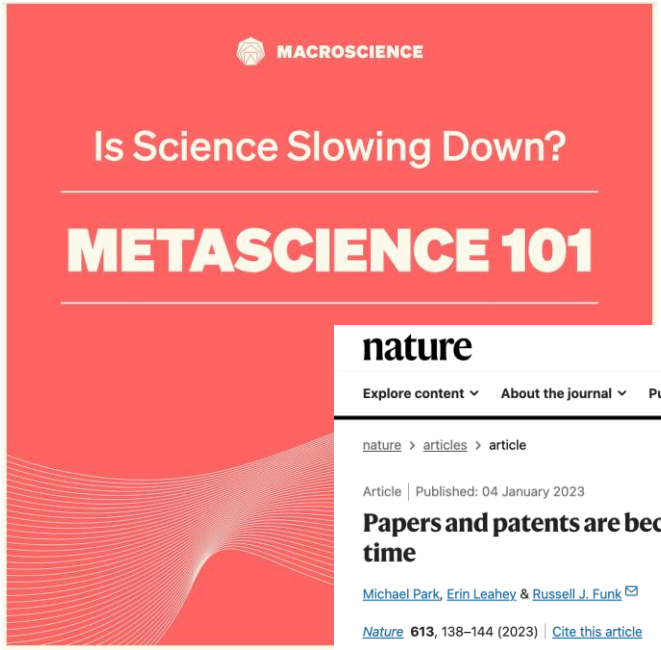
1. Main points

- Expenditure on research and development (R&D) performed in the UK was £70.7 billion in 2022 (in current prices), an increase of £4.4 billion since 2021 and £12.4 billion since 2018, which is the first period available since the redevelopment of R&D statistics began.
- The largest component of R&D expenditure was the business sector, at £49.9 billion (71% of the UK total); followed by the higher education sector, at £16.3 billion (23% of the UK total).
- The government sector, including UK Research and Innovation, performed £3.6 billion of R&D (5% of the UK total); the private non-profit sector performed the least, at £0.9 billion (1% of the UK total).
- Based on our latest available measure of gross domestic product (GDP), which does not yet incorporate the new R&D methodology, total UK R&D expenditure represented 2.77% of GDP in 2022; this figure is not comparable with previously published estimates, which were last included in the 2019 release.



1. Global & national R&D investment continues to rise, as does volume of scientific outputs – bringing sharper demands for accountability, impact & ROI

2. A ‘paradoxical’ concern over a slowing down in the pace of disruptive science & innovation – contributing to a wider stagnation in economic productivity

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Article | Published: 04 January 2023

Papers and patents are becoming less disruptive over time

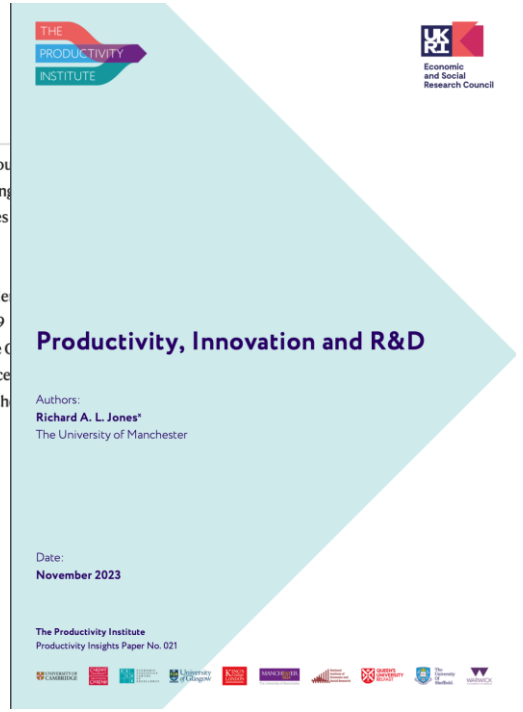
Michael Park, Erin Leahey & Russell J. Funk

Nature **613**, 138–144 (2023) | Cite this article

383k Accesses | **280** Citations | **4553** Altmetric | Metrics

Abstract

Theories of scientific and technological change view discovery and invention as endogenou processes[1,2], wherein previous accumulated knowledge enables future progress by allowing researchers to, in Newton's words, 'stand on the shoulders of giants'[3,4,5,6,7]. Recent decades have witnessed exponential growth in the volume of new scientific and technological knowledge, thereby creating conditions that should be ripe for major advances[8,9]. Yet contrary to this view, studies suggest that progress is slowing in several major fields[10,11]. He we analyse these claims at scale across six decades, using data on 45 million papers and 3.9 million patents from six large-scale datasets, together with a new quantitative metric—the C index[12]—that characterizes how papers and patents change networks of citations in science and technology. We find that papers and patents are increasingly less likely to break with th past in ways that push science and technology in new directions. This pattern holds universally across fields and is robust across multiple different citation- and text-based


THE PRODUCTIVITY INSTITUTE

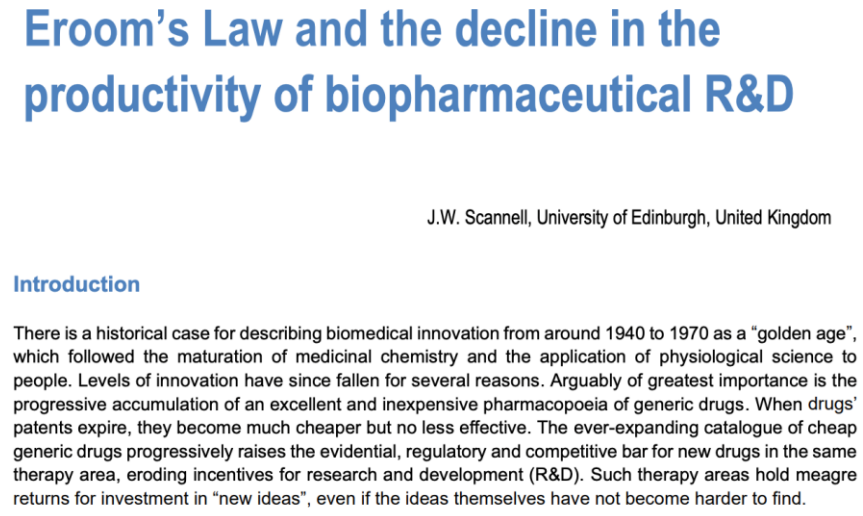
Productivity, Innovation and R&D

Authors:
Richard A. L. Jones*
The University of Manchester

Date:
November 2023

The Productivity Institute
Productivity Insights Paper No. 021

UK Research and Innovation
Economic and Social Research Council

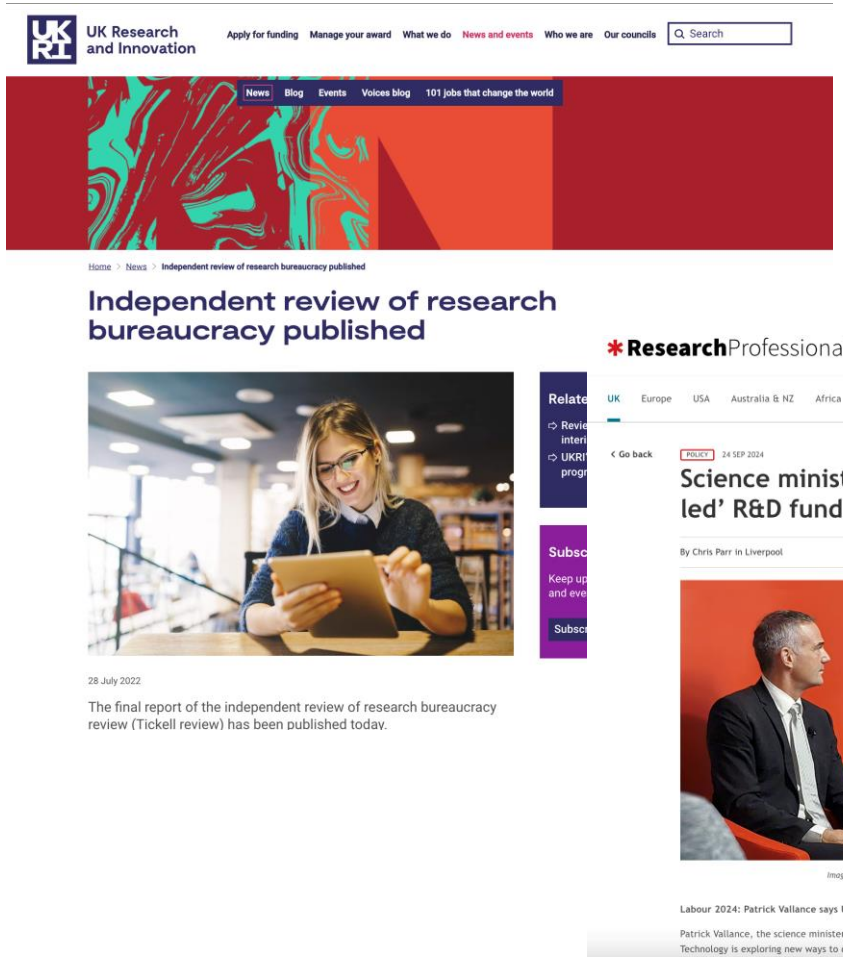

Eroom's Law and the decline in the productivity of biopharmaceutical R&D

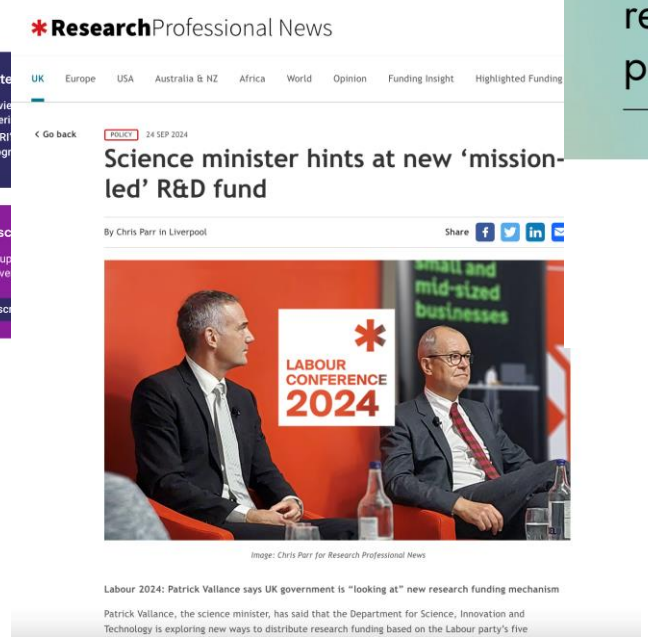
J.W. Scannell, University of Edinburgh, United Kingdom

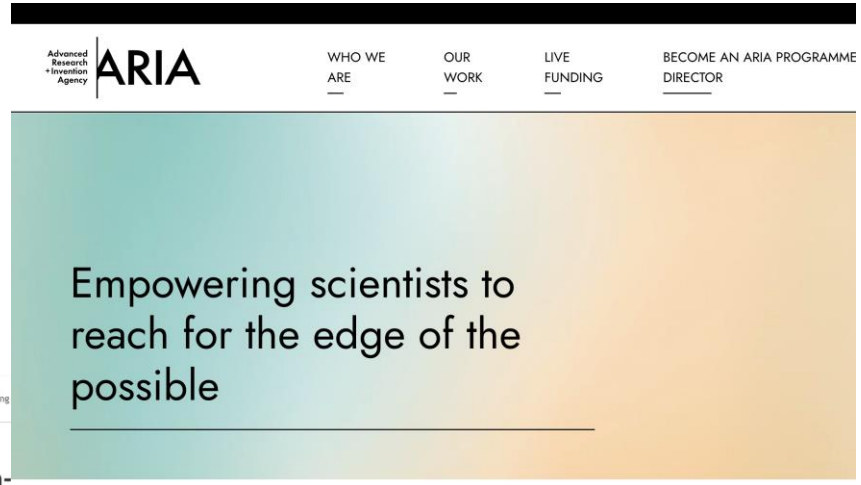
Introduction

There is a historical case for describing biomedical innovation from around 1940 to 1970 as a "golden age", which followed the maturation of medicinal chemistry and the application of physiological science to people. Levels of innovation have since fallen for several reasons. Arguably of greatest importance is the progressive accumulation of an excellent and inexpensive pharmacopoeia of generic drugs. When drugs' patents expire, they become much cheaper but no less effective. The ever-expanding catalogue of cheap generic drugs progressively raises the evidential, regulatory and competitive bar for new drugs in the same therapy area, eroding incentives for research and development (R&D). Such therapy areas hold meagre returns for investment in "new ideas", even if the ideas themselves have not become harder to find.

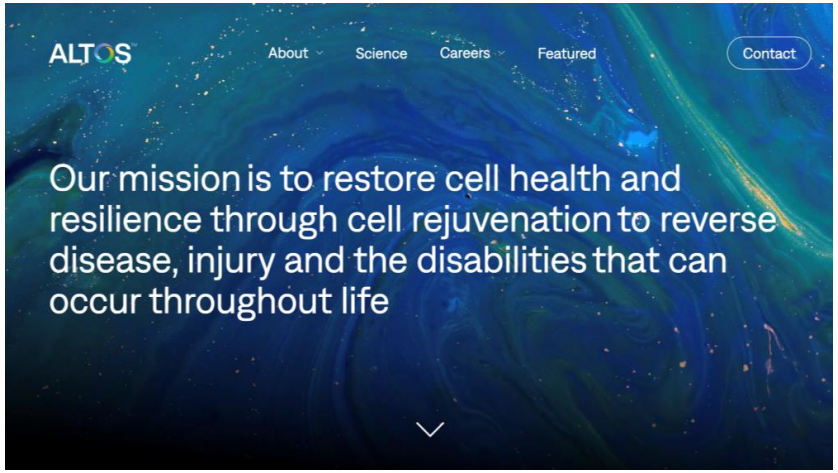
3. Worries about levels of bureaucracy & inefficiency in the R&D system and a growing appetite for novel funding models and new research institutions







ARIA is an R&D funding agency built to unlock scientific and technological breakthroughs that benefit everyone.



4. An ongoing crisis of replication, reproducibility and research integrity

COLLOQUIUM OPINION

Is science really facing a reproducibility crisis, and do we need it to?

Daniele Fanelli[a,1]

Edited by David B. Allison, Indiana University Bloomington, Bloomington, IN, and accepted by Editorial Board Member Susan T. Fiske November 3, 2017 (received for review June 30, 2017)

Efforts to improve the reproducibility and integrity of science are typically justified by a narrative of crisis, according to which most published results are unreliable due to growing problems with research and publication practices. This article provides an overview of recent evidence suggesting that this narrative is mistaken, and argues that a narrative of epochal changes and empowerment of scientists would be more accurate, inspiring, and compelling.

reproducible research | crisis | integrity | bias | misconduct

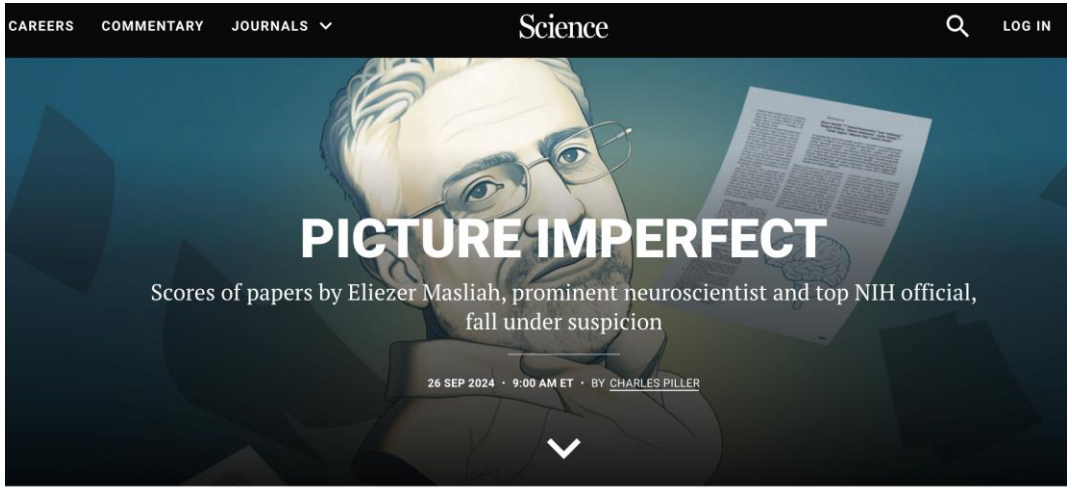
Is there a reproducibility crisis in science? Many seem to believe so. In a recent survey by the journal *Nature*, for example, around 90% of respondents agreed that there is a "slight" or "significant" crisis, and between 40% and 70% agreed that selective reporting, fraud, and pressures to publish "always" or "often" contribute to irreproducible research (1). Results of this non-

suggests that generalizations are unjustified; and (*iii*) not growing, as the crisis narrative would presuppose. Alternative narratives, therefore, might represent a better fit for empirical data as well as for the reproducibility agenda.

How Common Are Fabricated, False, Biased, and Irreproducible Findings?

Approximately 1 in 7 Scientific Papers Are Fake

James Heathers[12]



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5. A rapidly-changing landscape for scholarly communication and open research

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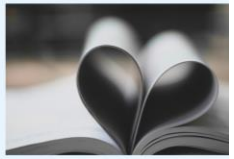
Review


Curate

April 2024

BUILDING A GLOBAL RESEARCH INITIATIVE ON OPEN SCIENCE

Towards Evidence based Open Science policies

PREPARED BY
Florian Naudet
Henriikka Mustajoki
Marin Dacos

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Plan U: Universal access to scientific and medical researc via funder preprint mandates

Richard Sever, Michael Eisen, John Inglis

Published: June 4, 2019 • https://doi.org/10.1371/journal.pbio.3000273

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Abstract
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Abstract

Preprint servers such as arXiv and bioRxiv represent a highly successful and relatively l mechanism for providing free access to research findings. By decoupling the disseminat manuscripts from the much slower process of evaluation and certification by journals, pr also significantly accelerate the pace of research itself by allowing other researchers to building on new results immediately. If all funding agencies were to mandate posting of preprints by grantees—an approach we term Plan U (for "universal")—free access to the world's scientific output for everyone would be achieved with minimal effort. Moreover, t

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BARCELONA DECLARATION ON OPEN RESEARCH INFORMATION

The research information landscape requires fundamental change. The signatories of the Barcelona Declaration on Open Research Information commit to taking a lead in transforming the way research information is used and produced. Openness of information about the conduct and communication of research must be the new norm.

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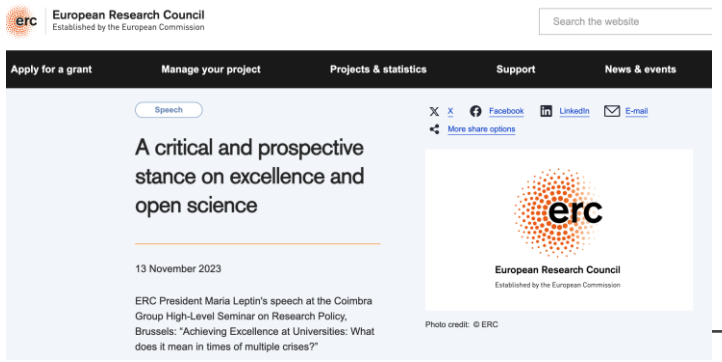
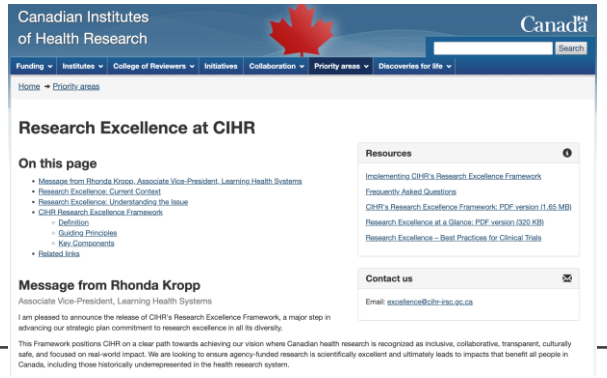
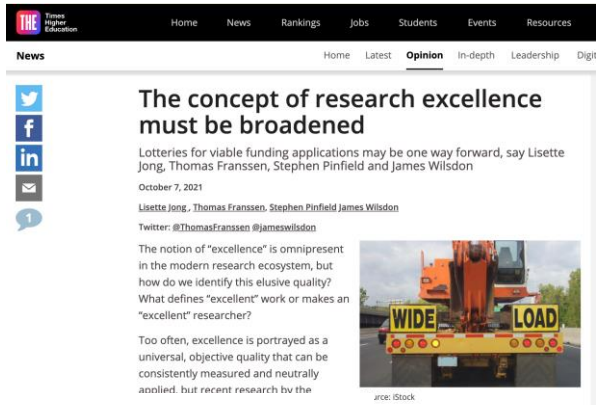
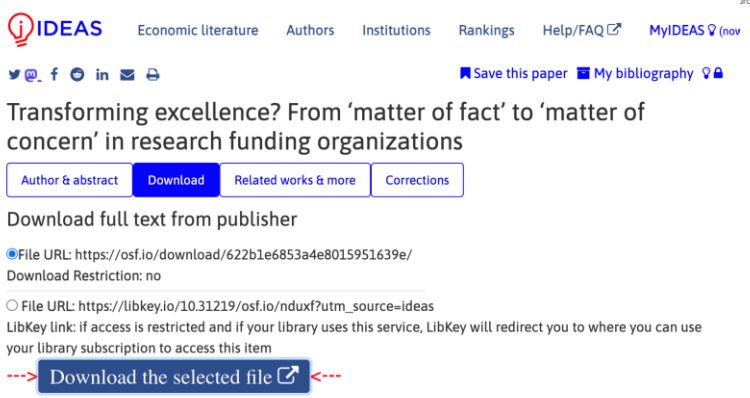
6. Pressures in research cultures and expanding notions of scientific excellence

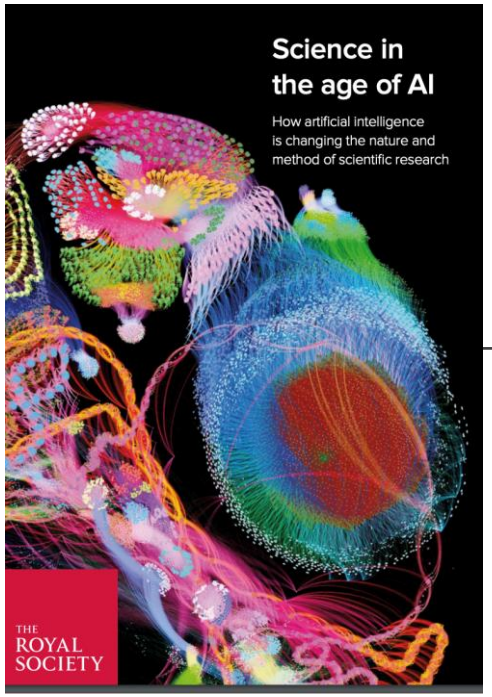


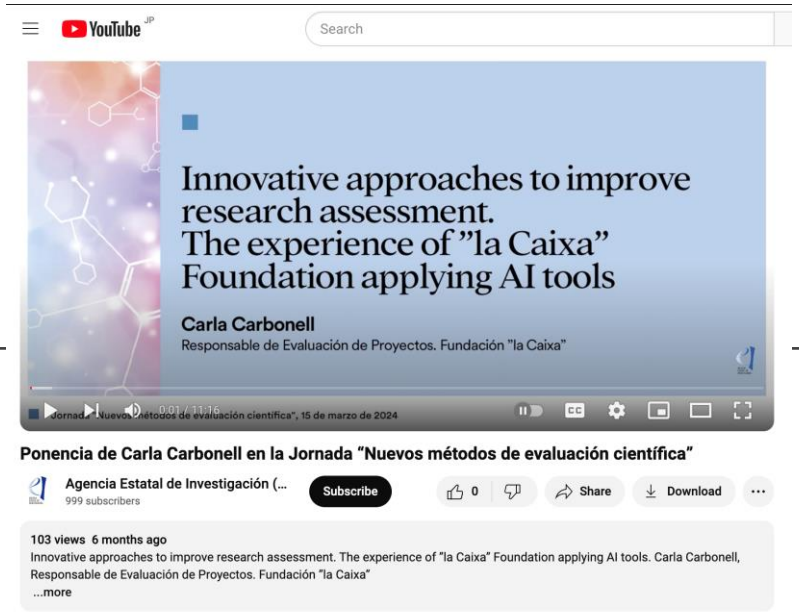


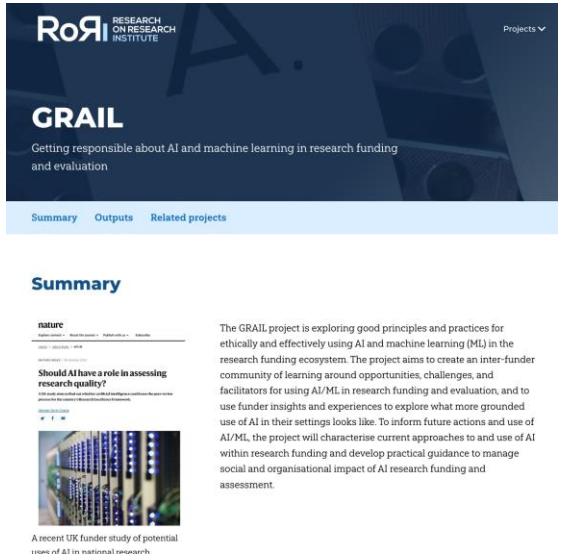




Already well underway and altering the demands and expectations placed on research, researchers and research funding – through a heightened focus on impact, TDR, team science, research culture, EDI etc.







7. Possibilities of new technologies & methods for measurement & evaluation (esp AI-based)

These need to be deployed responsibly but potentially they break down quant/qual divides, and combined with other methods, point towards richer proxies, reduced burdens, and real-time systems for monitoring research performance.

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Ensuring that we have the evidence we need to realise the full potential of research.

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RoRI aims to unlock more of the potential of the US$2.5 trillion invested globally in research every year. By turning the tools of research back on itself, RoRI generates data and analysis to improve how we fund, practice, evaluate and communicate research.

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Partners

RoRI has 18 core partners from 12 countries, who are responsible for the co-design and delivery of the RoRI programme

Our core partners

The Australian Research Council (ARC) is an independent body reporting to the Australian Government Minister for Education and Youth. The ARC administers a significant component of Australia's investment in research and development, provides advice to the Minister on matters related to research, and assesses the quality, engagement and impact of university research.

"la Caixa" Foundation is the major philanthropic institution in Spain and, with an annual budget of 600 million euros in 2024, one of the biggest in Europe. Its mission is to contribute to building a better and fairer society, giving more opportunities to those most in need, with the values of trust, excellence and social commitment. With 120 years of existence, the "la Caixa" Foundation main areas of action are social welfare, education, research and innovation and culture.

The Canadian Institutes of Health Research (CIHR) is Canada's federal funding agency for health research. Composed of 13 Institutes, they collaborate with partners and researchers to support the discoveries and innovations that improve our health and strengthen the healthcare system.

The Centre for Science and Technology Studies (CWTS) studies scientific research and its connections to technology, innovation, and society. Their research, bibliometric and scientometric tools, and evaluation expertise provide a solid basis for supporting research assessment and strategic decision making and for developing science policy.

Digital Science is an AI-focused technology company providing innovative solutions to complex challenges faced by researchers, universities, funders, industry and publishers. They work in partnership to advance global research for the benefit of society.

King Baudouin Foundation is an independent and pluralist foundation for the public interest. For over 45 years, the King Baudouin Foundation has been acting for the common good together with numerous partners, experts and donors. Their activities aim to foster sustainable and positive change in society, in Belgium, Europe and around the world.

The Luxembourg National Research Fund (FNR) is the main funder of research activities in Luxembourg. They invest public funds and private donations into research projects in various branches of science and the humanities, and we support activities to strengthen the link between science and society and to raise awareness for research.

Michael Smith Health Research BC is an integrated health research organisation created from the consolidation of Michael Smith Foundation for Health Research (MSFHR) and British Columbia Academic Health Science Network (BC AHSN) to support the growth and evolution of BC's vibrant health research system and life sciences sector.

The National Research Foundation of South Africa (NRF-SA) is the primary public sector agency tasked with providing funding across the research system in South Africa. As the single largest funder of human capital development in the country, through its Research, Innovation and Impact Support and Advancement (RIISA) programme, the NRF offers funding opportunities along the entire research pipeline – from the next-generation researchers to emerging researchers and established researchers.

Building partnerships to enable and accelerate progress towards these goals has been our focus from the start. **As RoRI has matured and grown, its greatest strength is its consortium of partners.**

We now have the active involvement of **more than 20 research funders from 15 countries,** who between them invest more than US$ 25 bn per year

Our partners are typically a vital source of data and case studies, or provide the strategic spaces in which we design and run experiments.

The Novo Nordisk Foundation is an independent Danish foundation with corporate interests. Their aims are to provide a stable basis for the commercial and research activities of the companies in the Novo Group (Novo Nordisk A/S and Novozymes A/S (Novonesis)), and to support scientific, humanitarian and social causes.

The Dutch Research Council (NWO) is the national research council of the Netherlands, ensuring quality and innovation in science. NWO selects and funds research proposals based on the advice of experts from science and society from the Netherlands and abroad. NWO encourages national and international collaboration, invests in large-scale research facilities, promotes knowledge utilisation, and manages research institutes.

The Social Sciences and Humanities Research Council (SSHRC) is a Canadian federal research funding agency that promotes and supports research and training in the humanities and social sciences.

The Swiss National Science Foundation (SNSF) is the leading Swiss organisation for the promotion of scientific research. In close collaboration with higher education institutions and other partners, the SNSF works towards creating the best possible conditions for the development and international integration of Swiss research.

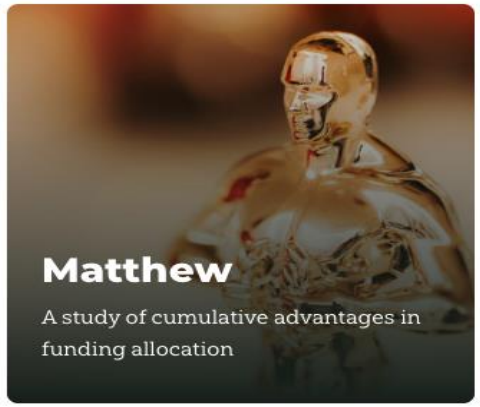
University College London (UCL) is London's leading multidisciplinary university and London's research powerhouse, with a commitment to transforming lives in the capital, across the UK and around the world.

UK Research and Innovation is a non-departmental public body of the Government of the United Kingdom that directs research and innovation funding.

The Volkswagen Foundation is the largest German private nonprofit organization involved in the promotion and support of academic research.

Wellcome is a global charitable foundation supporting science to solve the urgent health issues facing everyone. They work with policy makers, run advocacy campaigns, and form partnerships with other organisations to ensure everyone benefits from advances in health science.

The Gordon and Betty Moore Foundation is a US-based foundation established by Gordon E. Moore, co-founder of Intel, and his wife, Betty I. Moore, in 2000. The Foundation advances scientific discovery, environmental conservation, and the special character of the San Francisco Bay Area.

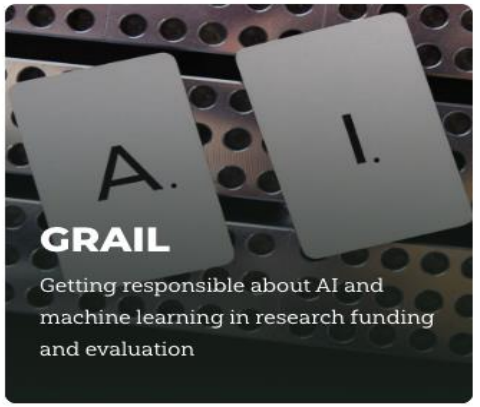


Matthew

A study of cumulative advantages in funding allocation

Narratives

The uses and evaluation of researchers' narrative CVs



GRAIL

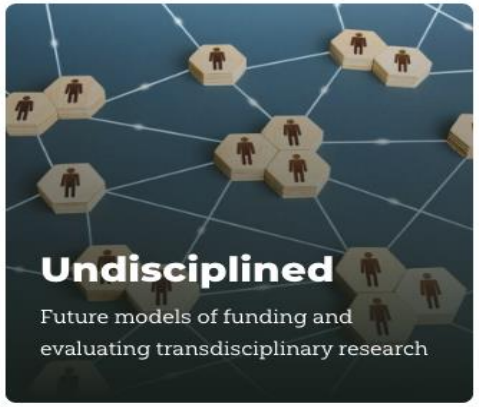
Getting responsible about AI and machine learning in research funding and evaluation

Funder Data Platform

Supporting data-sharing to unlock insights into research funding

AGORRA

A global observatory of responsible research assessment



Undisciplined

Future models of funding and evaluating transdisciplinary research

Peer Review

RoRI Atlas of Peer Review

Portfolios

Research funding landscape analysis

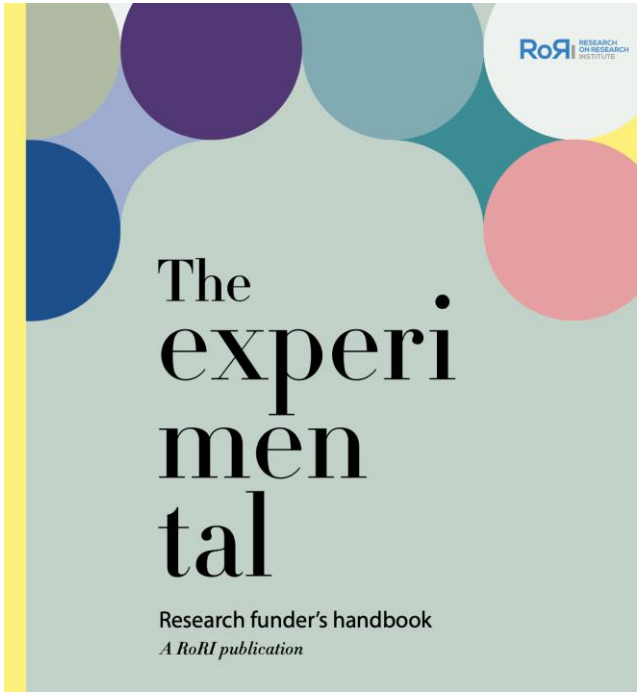
MetaROR

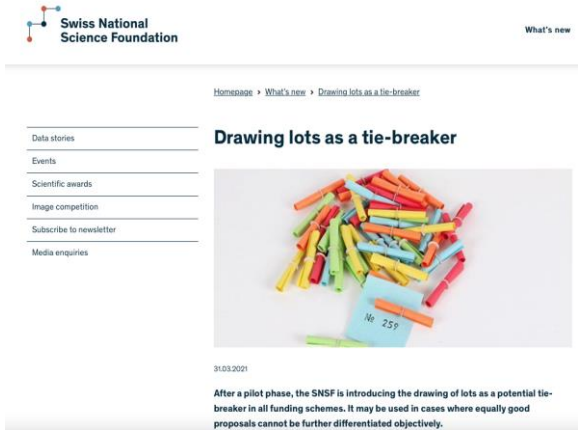
A new platform for metaresearch

AFIRE

Accelerator For Innovation & Research Funding Experimentation

Priority 1: More systematic, better-designed, larger-scale experiments with funding and evaluation





VolkswagenStiftung

JANUARY 31, 2024

Volkswagen Foundation introduces experimental Distributed Peer Review

Supported by RoRI researchers, the Foundation will run an experiment in parallel to its standard selection of proposals

RoR news

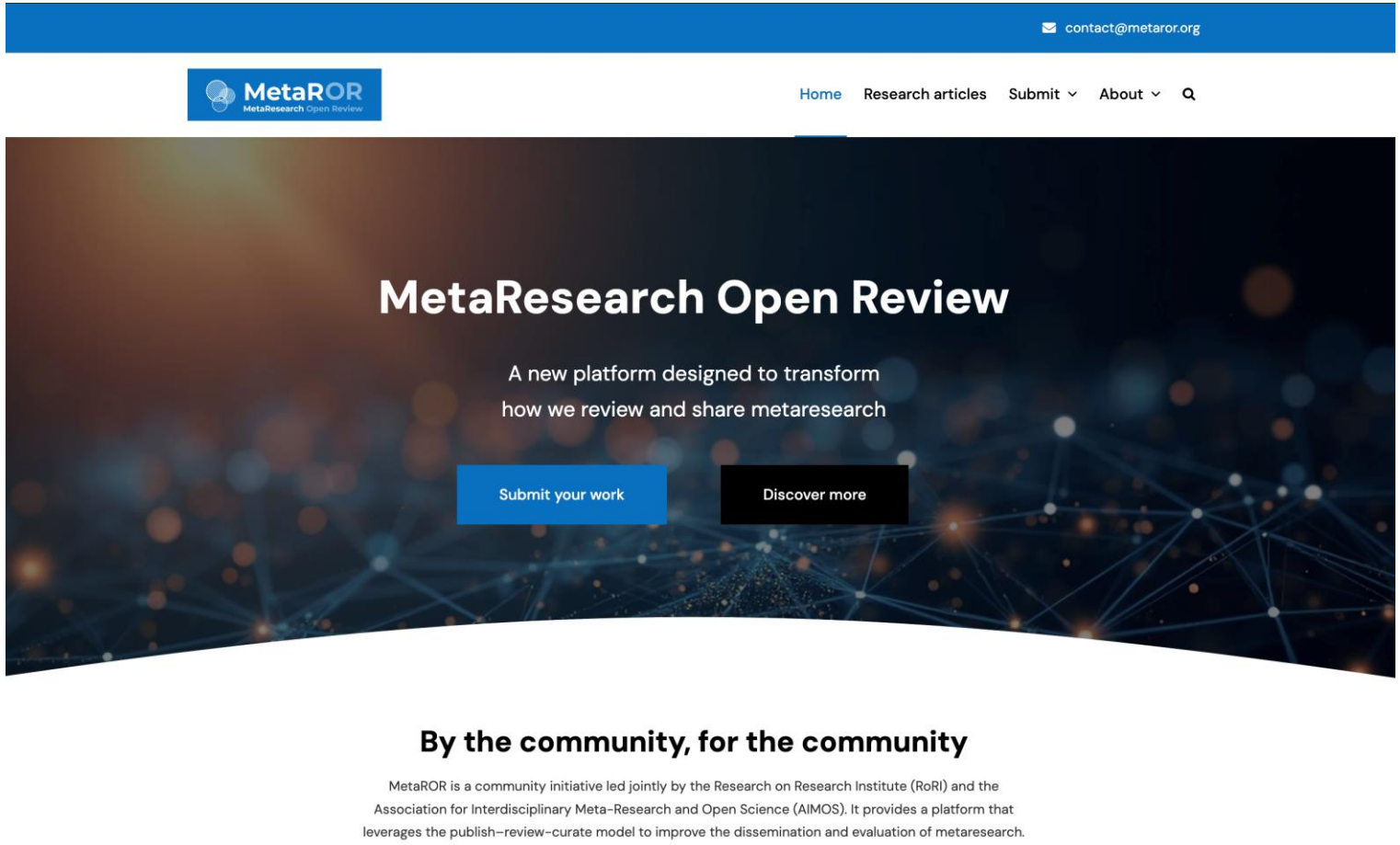
NATURE INDEX | 07 October 2024

New peer-review trial lets grant applicants evaluate each other's proposals

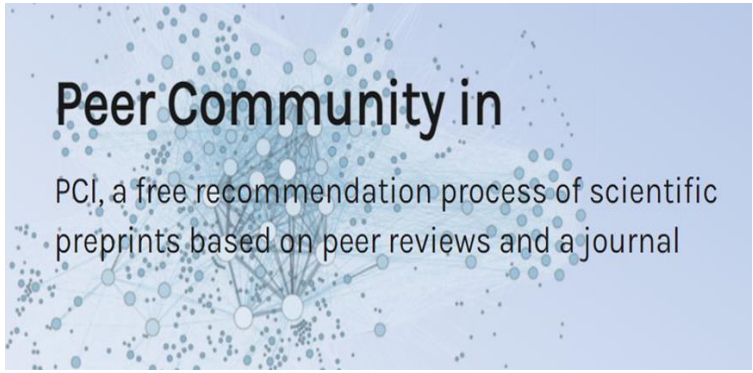
One of Germany's biggest research-funding organizations is hoping 'distributed peer review' can help to tackle the reviewer shortage.

By Dalmeet Singh Chawla

Priority 2: Invest in infrastructures



Learning from and building on related innovations in open research…



Some of our first submissions

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Article

Preprint review services: Disrupting the scholarly communication landscape

Susana Oliveira Henriques, Narmin Rzayeva, Stephen Pinfield, Ludo Waltman

Article

The Rise and Fall of the Initial Era

Simon Porter, Daniel Hook

Article

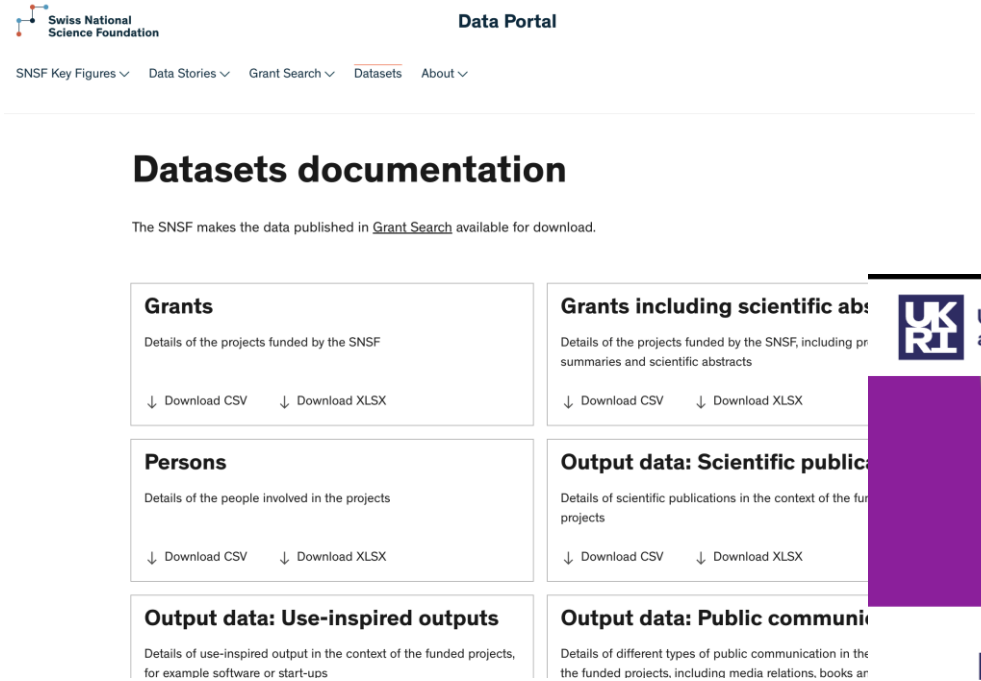
Researchers are willing to trade their results for journal prestige: results from a discrete choice experiment

Natalia Gonzalez Bohorquez, Sucharitha Weerasuriya, David Brain, Sameera Senanayake, Sanjeewa Kularatna, Adrian Barnett

MetaROR will not be a traditional scholarly journal, but a platform that operates according to a publish-review-curate model. This model is getting increasingly popular, especially in the life sciences, where it is used by journals such as eLife and F1000 Research.

Under MetaROR's publish-review-curate model, **researchers will first publish their work on an open repository or preprint server** such as MetaArXiv, SocArXiv or OSF Preprints and then submit it to MetaROR. Submissions will be handled by MetaROR editors, who will first perform a basic screening and then assign reviewers on the basis of their fit with a submission.

The role of a MetaROR editor is a form of voluntary communal service and will be advertised on a rolling basis on the platform website. Review reports and (optionally) reviewer identities will be published on the MetaROR platform and linked to the article in preprint form.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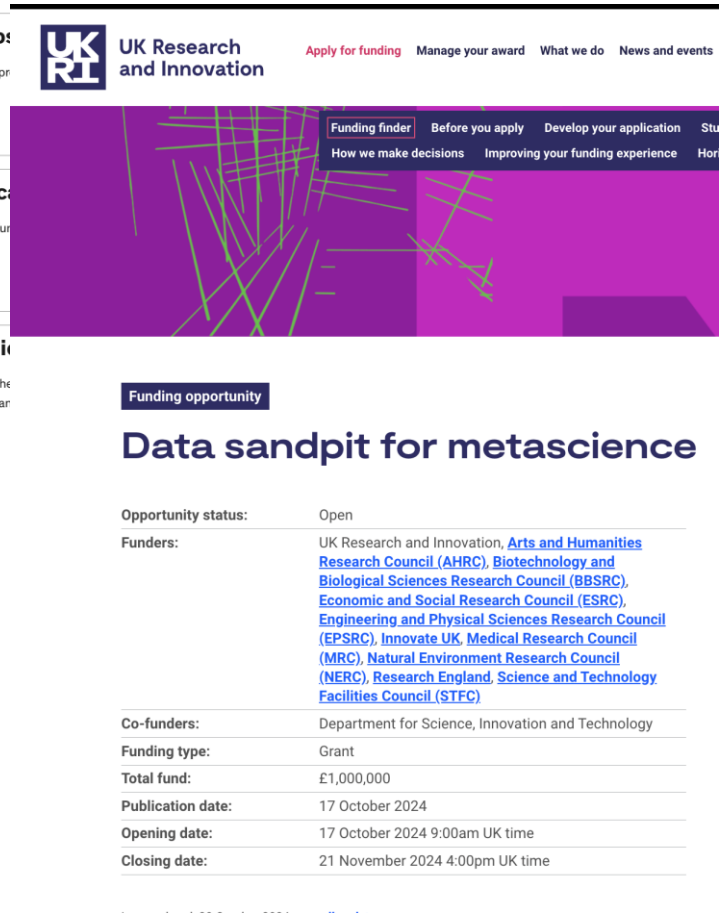
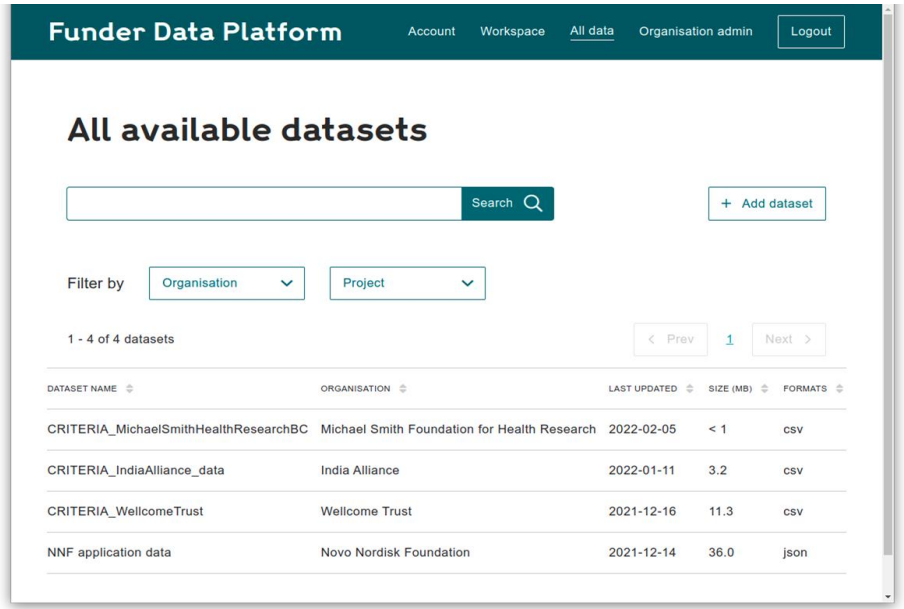
Output data: Use-inspired outputs
Details of use-inspired output in the context of the funded projects,
for example software or start-ups
Output data: Public communi
Details of different types of public communication in the
the funded projects, including media relations, books ar


UK Research and Innovation
Apply for funding
Manage your award
What we do
News and events
Funding finder
Before you apply
Develop your application
How we make decisions
Improving your funding experience
Funding opportunity
Data sandpit for metascience
Opportunity status: Open
Funders: UK Research and Innovation, Arts and Humanities Research Council (AHRC), Biotechnology and Biological Sciences Research Council (BBSRC), Economic and Social Research Council (ESRC), Engineering and Physical Sciences Research Council (EPSRC), Innovate UK, Medical Research Council (MRC), Natural Environment Research Council (NERC), Research England, Science and Technology Facilities Council (STFC)
Co-funders: Department for Science, Innovation and Technology
Funding type: Grant
Total fund: £1,000,000
Publication date: 17 October 2024
Opening date: 17 October 2024 9:00am UK time
Closing date: 21 November 2024 4:00pm UK time


Funder Data Platform
Account
Workspace
All data
Organisation admin
Logout
All available datasets
Search
Add dataset
Filter by
Organisation
Project
1 - 4 of 4 datasets
Prev
1
Next
DATASET NAME
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LAST UPDATED
SIZE (MB)
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11.3
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Novo Nordisk Foundation
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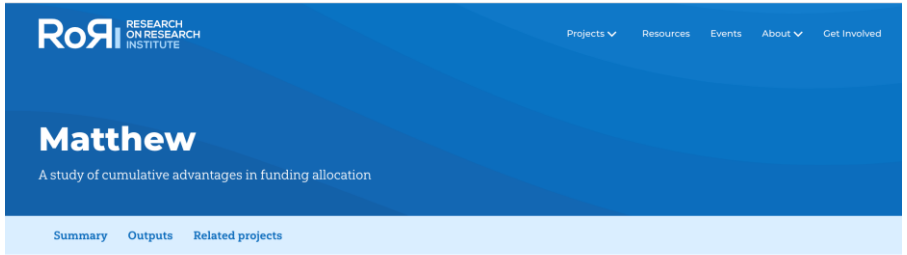

RoRI RESEARCH ON RESEARCH INSTITUTE
Projects
Resources
Events
About
Get Involved
Matthew
A study of cumulative advantages in funding allocation
Summary
Outputs
Related projects

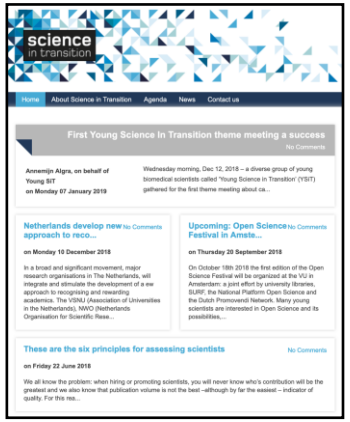
Priority 3: Foster more strategic cross-sector alliances

May 2013

DORA

https://sfdora.org

Nov 2013

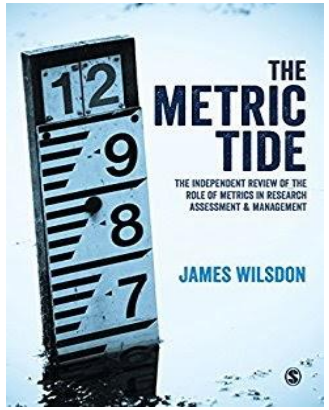


Science in Transition

Mar 2015

Leiden Manifesto

Jul 2015

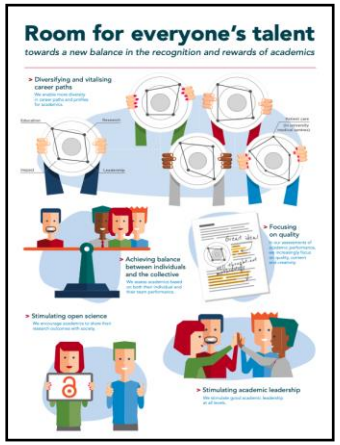


Metric Tide Report

Sept 2018

Plan S

Nov 2019

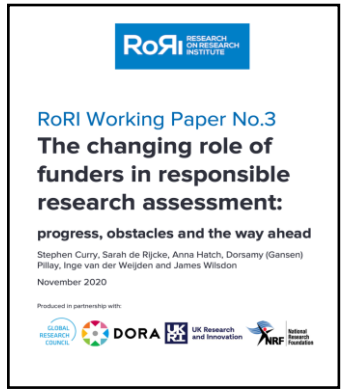


Netherlands initiative

Jul 2020

Hong Kong Principles

Nov 2020

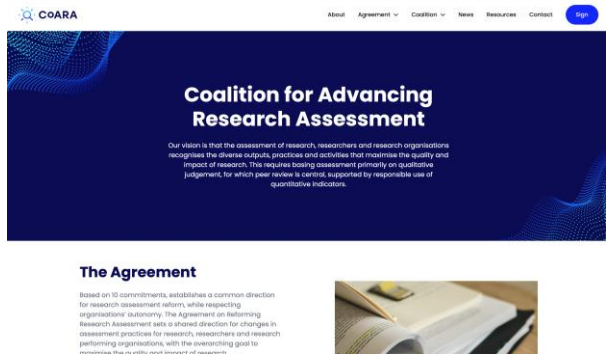


Report for GRC meeting

Nov 2021

EC Scoping Report

July 2022



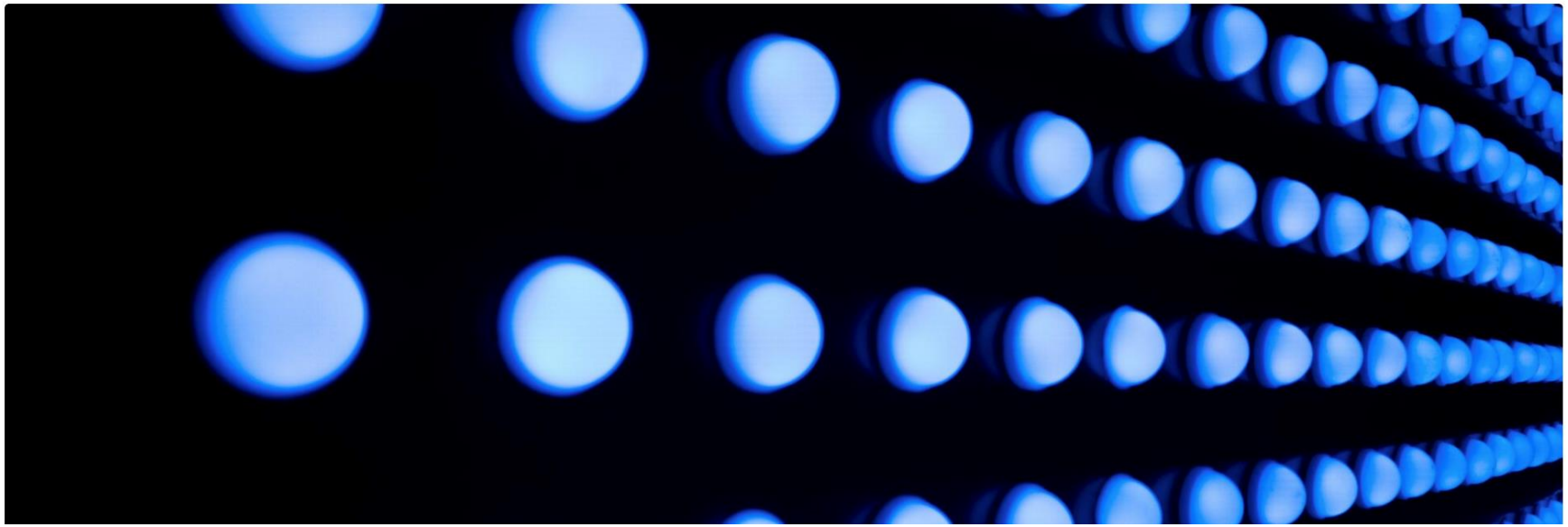
RoRI RESEARCH ON RESEARCH INSTITUTE

SEPTEMBER 13, 2024

Center for Open Science is looking for a Founding Program Manager for a Metascience Alliance

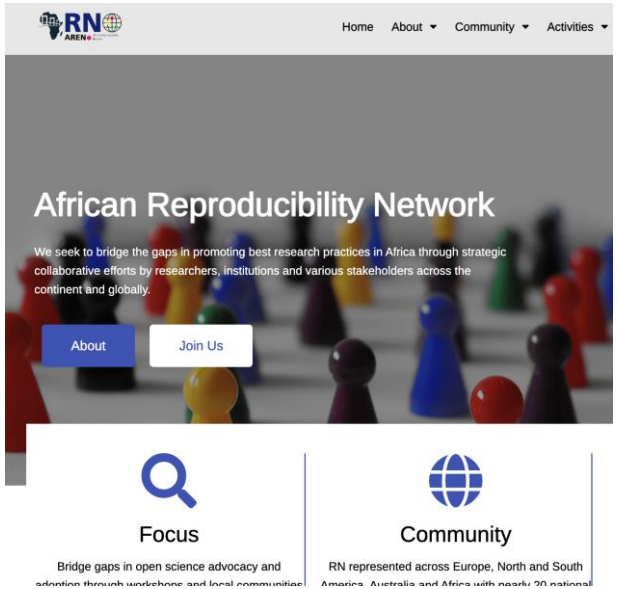
COS is seeking an independent contractor with interest and expertise in metascience and community building

General



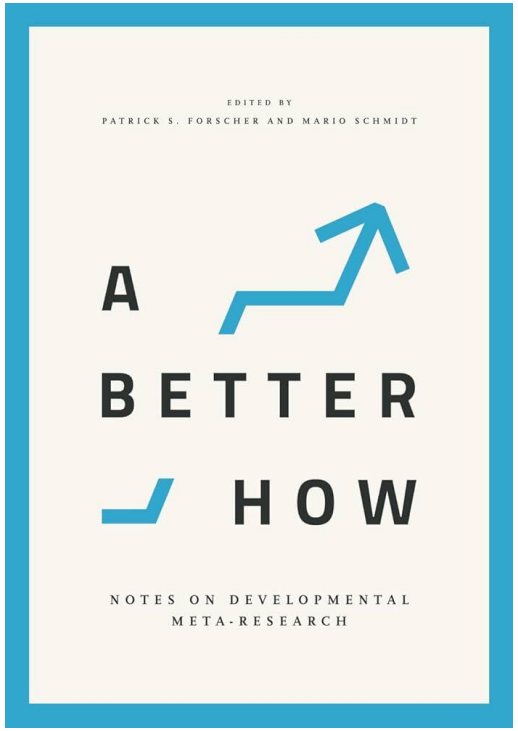
A new Metascience Alliance is set to be launched at Metascience 2025

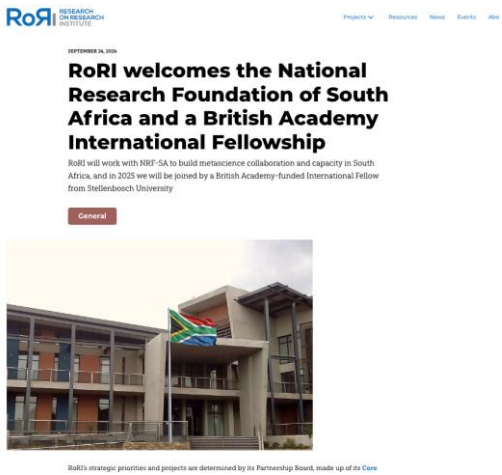
Priority 4: Expand metascientific conversations & networks to become more inclusively global



Meet the founder of a 100,000-strong Facebook group driving change in scientific integrity in Vietnam

Retraction Watch readers may have noticed an uptick of items in the RW Daily and Weekend Reads about scientific integrity issues in Vietnam over the past year. Many of those items had their genesis, and were circulated, on a Facebook group that now has close to 100,000 members — and was recently removed temporarily by Facebook. We asked Van Tu Duong, a researcher at Purdue University in West Lafayette, Indiana, USA, who





Priority 5: Build evidence of return on investment — & foster constructive self-criticism. Practice what we preach!

WHAT IS CRITICAL METASCIENCE?

Metascience is the science of science. Critical metascience takes a step back to question some common assumptions, approaches, problems, and solutions in metascience. Hence, it has also been described as meta-meta-science!

Philosophy of Science (2024), **91**, 1361–1371
doi:10.1017/psa.2024.2

SYMPOSIA PAPER

What is the Replication Crisis a Crisis Of?

Uljana Feest

Leibniz Universität Hannover, Germany
Email: feest@philos.uni-hannover.de

(Received 23 April 2023; revised 02 October 2023; accepted 05 October 2023; first published online 08 February 2024)

Abstract

In recent debates about the replication crisis, two positions have been domi
focuses on methodological reforms and one that focuses on theory building. T
up the suggestion that there might be a deeper difference in play, concernin
very subject matter of psychology is construed by opposing camps, i.e., in t
effects versus in terms of complexity. I argue that each gets something right
sufficient. My analysis suggests that the context sensitivity of the psycho
matter needs to be front and center of methodological and theoretical effor

1. Introduction

It has become a commonplace that psychology entered a crisis son
second decade of this century. The crisis was triggered by the rec
seemingly established experimental results could not be replicated, a
given rise to a high degree of stimulating methodological self-refl
psychology and has attracted philosophical attention as well. Rou
distinguish between two types of responses to the replication crisis, bot
the ubiquity of replication failures as symptomatic of a deeper probl
views the replication crisis as rooted in the prevalence of question
practices (e.g., p-hacking and retrospective hypothesis fitting), which giv
replicable results. Scholars in this debate, sometimes associated wi
science movement, have focused on ways in which psychological res
regulated, e.g., by calling for the preregistration of experiments.[1] Ano
scholars takes the narrow focus on (the replicability of) experimental e
be part of a larger problem, namely a relative sparsity of sustained theor
psychology. In turn, this has given rise to some efforts to develop met
theory construction and to think more generally about what theore
psychology might look like.

[1] https://www.cos.io/

Philosophy of Science (2022), **89**, 991–1001
doi:10.1017/psa.2022.45

SYMPOSIA PAPER

Open Science and Epistemic Diversity: Friends or Foes?

Sabina Leonelli

University of Exeter, Exeter, United Kingdom; Wissenschaftskolleg zu Berlin, Berlin, Germany
Email: s.leonelli@exeter.ac.uk

(Received 15 October 2021; revised 27 January 2022; accepted 26 April 2022; first published online 25 May 2022)

Abstract

I argue that Open Science as currently conceptualized and implemented does not take sufficient account of epistemic diversity within research. I use three case studies to exemplify how Open Science threatens to privilege some forms of inquiry over others, thus exasperating divides within and across systems of practice, and overlooking important sources and forms of epistemic diversity. Building on insights from pluralist philosophy, I then identify four aspects of diverse research practices that should serve as reference points for debates around Open Science: (1) specificity to local conditions, (2) entrenchment within repertoires, (3) permeability to newcomers, and (4) demarcation strategies.

"The empirical question is how belief, commitment, or theory and hypothesis acceptance are stabilised in the face of openness of inquiry. The normative question is how they are stabilised in a nonarbitrary way that has probative value." Longino (2003, 205)

1. Introduction

The potential of Open Science (OS) to enhance research quality, integrity, and societal impact has been widely discussed within academic and policy circles over the last two decades, and has been underscored by the rapid development of COVID-19 treatments and vaccines—an extraordinary scientific achievement that was arguably only possible through the immediate sharing of results globally. The effectiveness of disseminating results promptly, sometimes even before having them formally published—thereby speeding up research—has been extolled by scientific and popular media alike, most evidently in relation to the prompt dissemination of genetic sequencing data from various strains of the SARS-COV-2 virus (an exemplary instance of "Open Data"), and the decision by publishing companies to temporarily release all coronavirus-related papers

JOURNAL OF RESPONSIBLE INNOVATION
2024, VOL. 11, NO. 1, 2371172
https://doi.org/10.1080/23299460.2024.2371172

Routledge
Taylor & Francis Group

COMMENT

OPEN ACCESS

Scandal in scientific reform: the breaking and remaking of science

Bart Penders [a,b]

[a]Käte Hamburger Kolleg "Cultures of Research", RWTH Aachen University, Aachen, Germany; [b]Department of Health, Ethics & Society, Care and Public Health Research Institute (Caphri), Faculty of Health, Medicine and Life Sciences, Maastricht University, Maastricht, The Netherlands

ABSTRACT

This perspective explores the Scientific Reform Movement and its links to scandalized claims, such as 'science is broken'. It delves into the pivotal role of scandal in shaping and sustaining this movement, both rhetorically and politically and portrays scandals as powerful catalysts for change, driving formal requirements for rigor and transparency and giving rise to influential voices like the Center for Open Science. However, there are also potential negative consequences of scandalization, including risking public trust in science and harming careers. This leads to the question of whether reform can occur without the harmful effects of scandalization and ends with a proposal for a need for institutions to adopt a more adaptive and humble character to minimize, but not abandon scandals as a reform strategy.

ARTICLE HISTORY
Received 22 January 2024
Accepted 19 June 2024

KEYWORDS
Scandal; Scientific reform; Repair; Moral economy

Broken science: a scandal is made

'Science is broken' (e.g. Hilgard and Jamieson 2017) is the diagnosis that fueled w
now identify as the 'Scientific Reform Movement'. Scientific Reform encompasse
science initiatives and programmes (David 2008; Leonelli 2013; Mirowski 2018;
et al. 2015), replication drives (Munafò et al. 2017; Penders 2022; Peterson and Pa
2021) and evaluation reforms (De Rijcke et al. 2016; Hicks et al. 2015), all geared t
this broken science. Field has described Science Reform as seeking 'to better the
which research is planned, conducted and reported – through driving transparen
openness in the scientific process up, and misconduct and poor research practices
(Field 2022, 3). Science Reform, she argues, was a response to reports of fraud an
tionable research processes (Stroebe, Postmes, and Spears 2012), a response to 't
that the foundational research of one's field is somehow contaminated or rotten'
the centre of the movement, a group of scientists developed a profile of 'reformer'

CONTACT Bart Penders b.penders@maastrichtuniversity.nl Käte Hamburger Kolleg "Cultures of Researc
Aachen University, Theaterstraße 75, 52062 Aachen, Germany; Department of Health, Ethics & Society, Care a
Health Research Institute (Caphri), Faculty of Health, Medicine and Life Sciences, Maastricht University, Maast
Netherlands

Minerva (2023) 61:147–174
https://doi.org/10.1007/s11024-023-09490-3

Metascience as a Scientific Social Movement

David Peterson[1] · Aaron Panofsky[2]

Accepted: 7 March 2023 / Published online: 24 April 2023

Abstract The "reproducibility crisis" has been one of the most significant stories in science in the past 15 years and has led to significant policy changes across the research landscape. Yet, scandals, irreproducible studies, and cries of crisis have occurred for decades in science. This article seeks to explain why the reproducibility crisis has taken root and become a force in science policy in ways previous crises have not. In short, we argue that it was through the scientific, institutional, and cultural efforts of a group of scientific activists we are calling metascientists. Metascience is a scientific social movement that seeks to use quantification and experimentation to diagnose problems in research practice and improve efficiency. It draws together data scientists, experimental and statistical methodologists, and open science activists into a project with both intellectual and policy dimensions. Metascientists have been remarkably successful at winning grants, motivating news coverage, and changing policies at science agencies, journals, and universities. The social movement lens is useful for understanding the popularization and impact of the reproducibility crisis narrative and suggests ways the institutions of science are adapting to meet a changing political and technological landscape.

Keywords Metascience · Reproducibility crisis · Replication crisis · Scientific social movements

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davidpeterson@purdue.edu

Aaron Panofsky
apanofsky@g.ucla.edu

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[2] Institute for Society and Genetics, University of California, Los Angeles, Life Sciences Building 3323D, Los Angeles, CA 90095-7221, USA

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Finally: an invitation!

Join us in London from 30 June to 2 July 2025 for "the Glastonbury of metasicence"