

AI & machine learning in research assessment: can we draw lessons from debates over responsible metrics?

RoRI & RCN workshop, Act One, 11 January 2021

James Wilsdon. j.wilsdon@sheffield.ac.uk;  @jameswilsdon

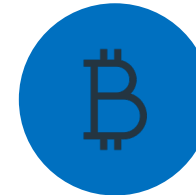
Our five aims for the pilot phase (2020-2021)



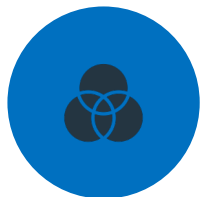
To support and build capacity for interdisciplinary, mixed-method and translational RoR in and across research systems worldwide
(research role)



To connect academic RoR capabilities to the data and analytical resources of our founding and strategic partners
(translation role)



With these partners, to experiment, coproduce and test new tools, indicators, funding modes, decision and evaluation frameworks
(innovation role)



To critically evaluate RoR methods and support engagement with RoR data and evidence by decision makers and wider society
(brokerage role)



To create an independent space for RoR learning, networking and collaboration between researchers, policymakers, funders and technologists
(facilitator role)

Our consortium

Founding partners:

Wellcome Trust
Digital Science
University of Sheffield
CWTS, Leiden University

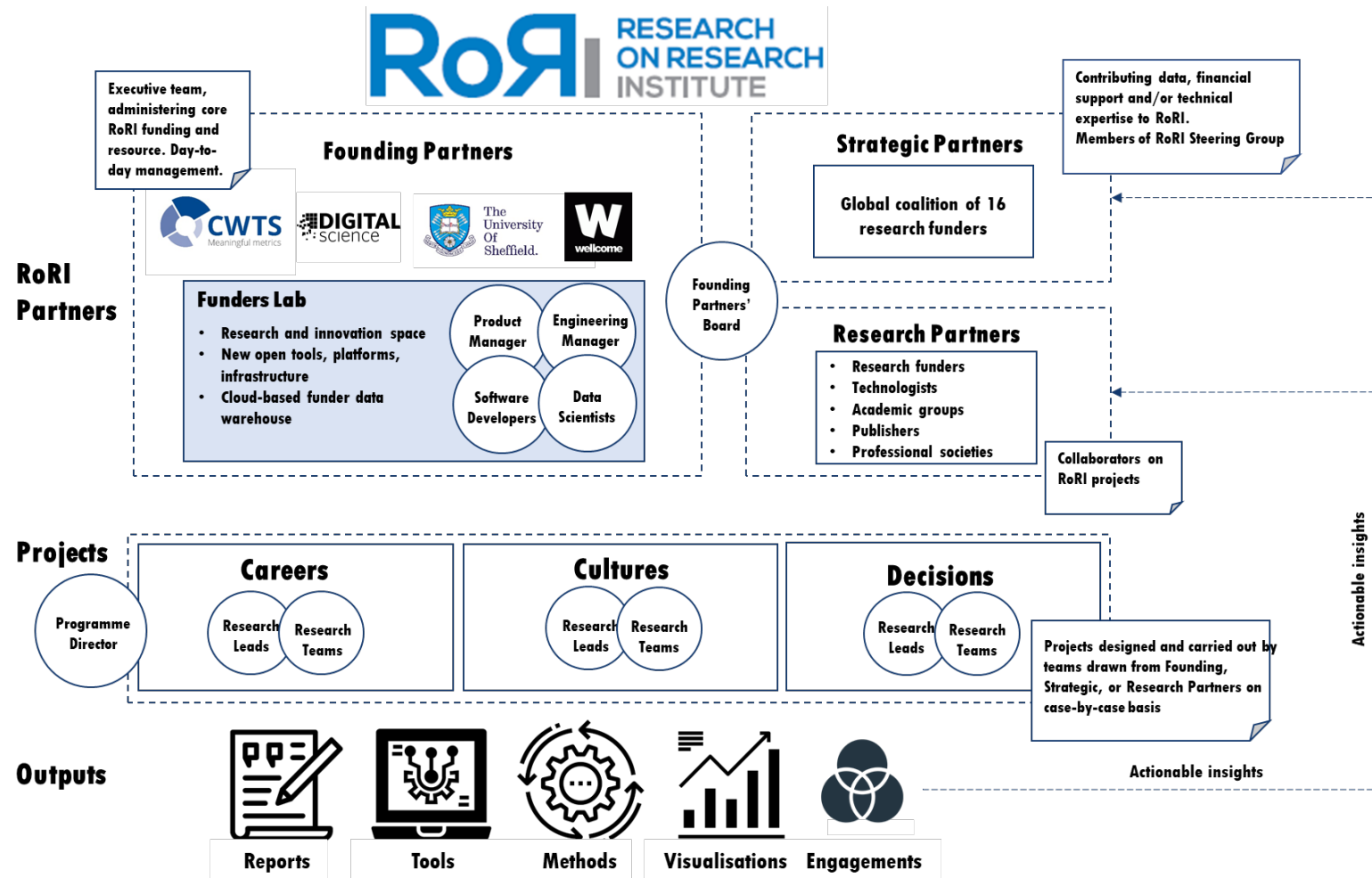


Strategic partners *(for pilot phase, 17 partners from 13 countries and regions):*

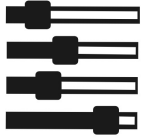
African Academy of Sciences
Australian Research Council (ARC)
Austrian Science Fund (FWF)
Canadian Institutes of Health Research (CIHR)
Chan Zuckerberg Initiative (CZI)
European Molecular Biology Organization
Fondazione Telethon
Howard Hughes Medical Institute (HHMI)
DBT/Wellcome Trust India Alliance

Michael Smith Foundation for Health Research (MSFHR)
National Institute for Health Research (NIHR)
Novo Nordisk Foundation
Research Council Norway (RCN)
Alfred P. Sloan Foundation
Swiss National Science Foundation (SNSF)
UK Research and Innovation (UKRI)
Volkswagen Foundation

RoRI consortium partners as co-designers and co-producers



RoRI first-wave projects (2020/21)



CRITERIA

Summary

Funders need their proposal selection processes to do one thing: select the proposals most likely to meet their objectives. Various inequalities in funding rates may exist, such as gender or field inequalities. The selection process a funder uses may mitigate or exacerbate these inequalities. The project will use data from many funders who each use different selection processes in different contexts. The outputs will help funders understand the potential drivers of inequalities in research funding and identify where mitigation is possible.

Partners: Australian Research Council; Canadian Institutes of Health Research; Chan Zuckerberg Initiative; EMBO; Austrian Science Fund (FWF); Michael Smith Foundation for Health Research; Novo Nordisk Fonden; Research Council Norway; W/DBT India Alliance; UKRI; Wellcome Trust



EXCELLENCE

Summary

Initiatives like the UK's REF, Germany's Exzellenzinitiative and Switzerland's Eccellenza grants have put excellence at the centre of research policy and evaluation. This project will assess the ways in which the idea of excellence is currently used by key actors in the research ecosystem and the functions it serves in specific practices in order to explore its possible futures. It will include detailed case studies of 10 funders.

Partners: African Academy of Sciences; Australian Research Council; Canadian Institutes of Health Research; Austrian Science Fund (FWF); Michael Smith Foundation for Health Research; National Institute for Health Research (UK); Swiss National Science Foundation; Wellcome Trust.



FAIRware

Summary

This project aims to build open source software tool(s) to allow researchers, institutions and funders to assess and improve the 'FAIRness' of the research outputs they produce. Over recent years, the FAIR principles (Findability, Accessibility, Interoperability, Reusability) have gained considerable traction as a basis for describing how research data, and potentially other research outputs, should be documented and shared to ensure that they can be discovered, accessed and used effectively, such that their value is maximised.

Partners: Canadian Institutes of Health Research; National Institute for Health Research (UK); Swiss National Science Foundation; Wellcome Trust.

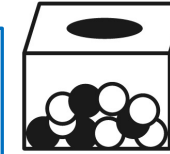


PATHWAYS

Summary

The scope of this work is careers in research, broadly defined, with an empirical and policy focus on six countries: Austria, Canada, Denmark, Germany, UK and USA. The project will be designed and delivered by a team drawn from RoRI strategic partners in these countries, and a wider network of data, research and policy partners.

Partners: Canadian Institutes of Health Research; Austrian Science Fund (FWF); Howard Hughes Medical Institute; Michael Smith Foundation for Health Research; National Institute of Health Research (UK).

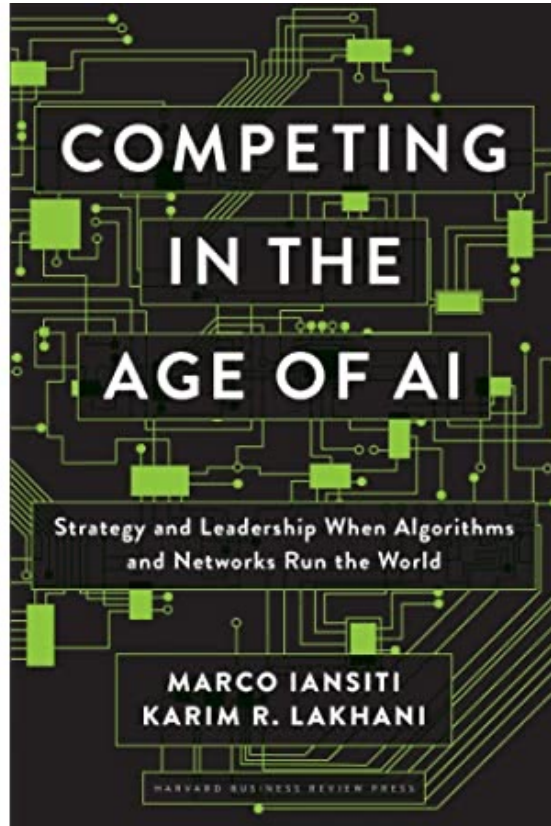


RANDOMISATION

Summary

There is growing interest in the use of randomisation and lottery-type mechanisms in grant funding. By linking and supporting a series of linked and phased experiments with uses of focal, or targeted randomisation in funding processes (our preferred term to the sometimes misleading "lotteries"), and facilitating closer alignment and learning between these, the RoRI consortium could effectively undertake the largest multi-funder, cross-country trial and analysis of these techniques.

Partners: National Institute of Health Research (UK); Novo Nordisk Fonden; Swiss National Science Foundation.



THE
ROYAL
SOCIETY

The
Alan Turing
Institute

The AI revolution in scientific research

The Royal Society and The Alan Turing Institute

The Royal Society is the UK's national academy of sciences. The Society's fundamental purpose, reflected in its founding Charters of the 1660s, is to recognise, promote, and support excellence in science and to encourage the development and use of science for the benefit of humanity.

The Alan Turing Institute is the UK's national institute for data science and artificial intelligence. Its mission is to make great leaps in research in order to change the world for the better.

In April 2017, the Royal Society published the results of a major policy study on machine learning. This report considered the potential of machine learning in the next 5 – 10 years, and the actions required to build an environment of careful stewardship that can help realise its potential. Its publication set the direction for a wider programme of Royal Society policy and public engagement on artificial intelligence (AI), which seeks to create the conditions in which the benefits of these technologies can be brought into being safely and rapidly.

As part of this programme, in February 2019 the Society convened a workshop on the application of AI in science. By processing the large amounts of data now being generated in fields such as the life sciences, particle physics, astronomy, the social sciences, and more, machine learning

Data in science: from the t-test to the frontiers of AI

Scientists aspire to understand the workings of nature, people, and society. To do so, they formulate hypotheses, design experiments, and collect data, with the aim of analysing and better understanding natural, physical, and social phenomena.

Data collection and analysis is a core element of the scientific method, and scientists have long used statistical techniques to aid their work. In the early 1900s, for example, the development of the t-test gave researchers a new tool to extract insights from data in order to test the veracity of their hypotheses. Such mathematical frameworks were vital in extracting as much information as possible from data that had often taken significant time and money to generate and collect.

Examples of the application of statistical methods to scientific challenges can be seen throughout history, often leading to discoveries or methods that underpin the fundamentals of science today, for example:

- The analysis by Johannes Kepler of the astronomical measurements of Tycho Brahe in the early seventeenth century led to his formulation of the laws of planetary motion, which subsequently enabled Isaac Newton FRS (and others) to formulate the law of universal gravitation.



Research 4.0: Research in the age of automation

15 SEPTEMBER 2020

AUTHORS

Ben Glover

Elliot Jones

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DOWNLOAD REPORT



There is a growing consensus that we are at the start of a fourth industrial revolution, driven by developments in Artificial Intelligence, machine learning, robotics, the Internet of Things, 3-D printing, nanotechnology, biotechnology, 5G, new forms of energy storage and quantum computing.

This report seeks to understand what impact AI is having on the UK's research sector and what implications it has for its future, with a particular focus on academic research.

Building on our interim report, we find that AI is increasingly deployed in academic research in the UK in a broad range of disciplines. The combination of an explosion of new digital data sources with powerful new analytical tools represents a 'double dividend' for researchers. This is allowing researchers to investigate questions that would have been unanswerable just a decade ago.

Whilst there has been considerable take-up of AI in academic research, the report highlights that steps could be taken to ensure even wider adoption of these new techniques and technologies, including wider training in the necessary skills for effective utilisation of AI, faster routes to culture change and greater multi-disciplinary collaboration.

Good practices in uses of ML/AI by research funders

A few funders at the forefront

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NEWS • 14 MAY 2019

Artificial intelligence is selecting grant reviewers in China

The country's major funding agency says the tool reduces the time it takes to find referees.

David Cyranoski

China's largest funder of basic science is piloting an artificial intelligence tool that selects researchers to review grant applications, in an attempt to make the process more efficient, faster and fairer. Some researchers say the approach by the National Natural Science Foundation of China is world-leading, but others are sceptical about whether AI can improve the process.

Choosing researchers to peer review project proposals or publications is time-consuming and prone to bias. Several academic publishers are experimenting with artificial intelligence (AI) tools to select reviewers and carry out other tasks, and a few funding agencies, including some in North America and Europe, have trialled simple AI tools to identify potential reviewers. Some of these systems match keywords in grant applications to those in publications of other scientists.

The National Natural Science Foundation of China (NSFC) is building a more sophisticated system that will crawl online scientific-literature databases and

PDF version

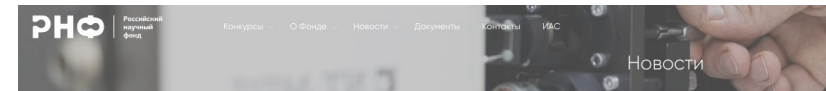
RELATED ARTICLES

AI peer reviewers unleashed to ease publishing grind

Male researchers' 'vague' language more likely to win grants

How machine learning could keep dangerous DNA out of terrorists' hands

SUBJECTS



27 ноября, 2019 — 16:23

No jumps to the “kings row”: RSF pushes the new AI-based system of finding reviewers

Источник: [Indicator.ru](#)

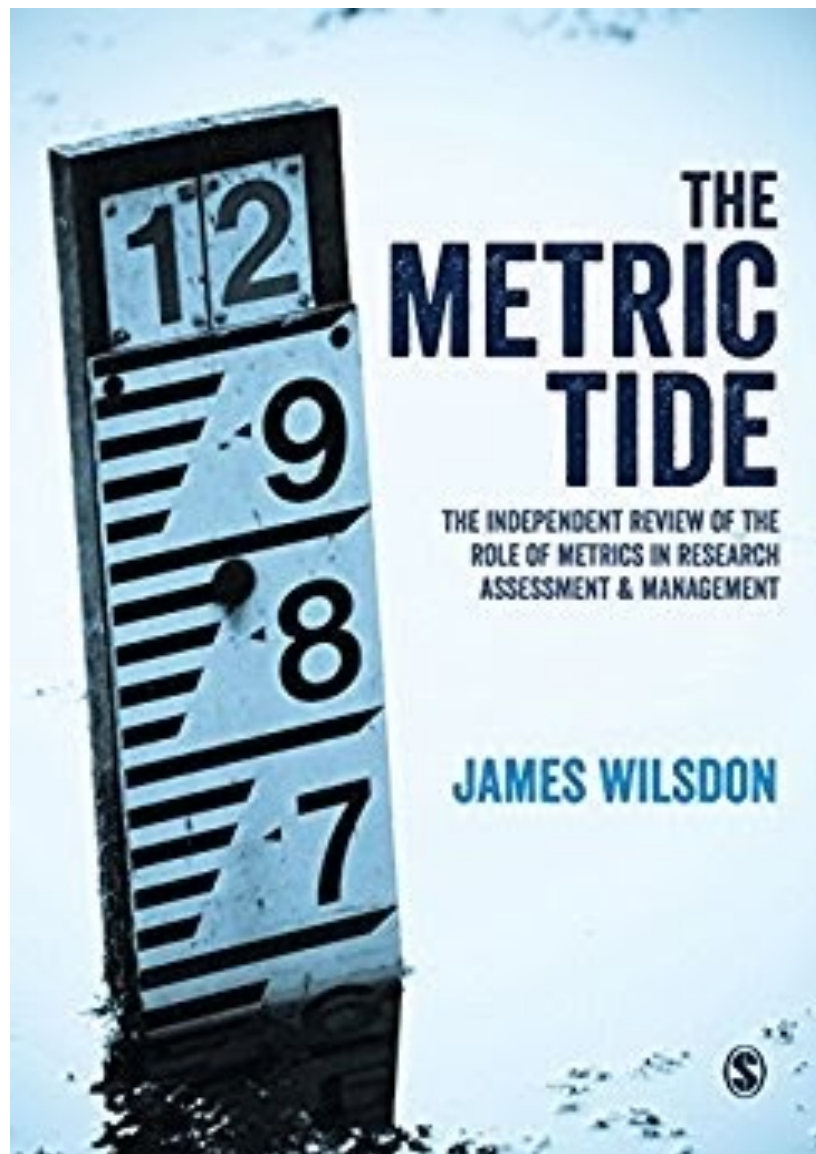
Indicator.Ru describes who in the Russian Science Foundation will benefit from the automatic tool of finding reviewers, what problems it will help to solve, and which not, how to resist incompetence and to avoid potential biases from assigning “negative” and “positive” reviewers.



What is new, what remains the same?

Over recent years, concern has intensified over several long-standing problems linked to research assessment:

- the **misapplication of narrow criteria and indicators of research quality or impact**, in ways that distort incentives, create unsustainable pressures on researchers, and exacerbate problems with research integrity & reproducibility.
- this narrowing of criteria and indicators has **reduced the diversity of research missions and purposes**, leading institutions and researchers to adopt similar strategic priorities, or to focus on lower-risk, incremental work.
- **systemic biases against those who do not meet—or choose not to prioritise—narrow criteria and indicators** of quality or impact, have reduced the diversity, vitality and representative legitimacy of the research community.
- a **diversion of policy & managerial attention to things that can be measured**, at the expense of less tangible or quantifiable qualities, impacts, assets and values – a trend exacerbated by flawed university league tables.



RoRI Working Paper No.3

The changing role of funders in responsible research assessment:

progress, obstacles and the way ahead

Stephen Curry, Sarah de Rijcke, Anna Hatch, Dorsamy (Gansen) Pillay, Inge van der Weijden and James Wilsdon

November 2020

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DORA



UK Research
and Innovation



National
Research
Foundation

Aims of this series

To date, there has been less discussion of applications of ML/AI in the design and management of the research system itself – and to processes of peer review, evaluation, synthesis and assessment – although a handful of funders are starting to experiment with this in various ways. As with all uses of ML/AI, enthusiasm about technological possibilities is tempered with concern about inbuilt biases, blind spots and unintended consequences. These workshops will bring together a select group of research funders to share insights by:

- Creating an arena for funders to share evidence and experiences with ML/AI applications and techniques;
- Discussing and disseminating ‘good practice’ in emerging uses of ML/AI among RoRI partners;
- Exploring what responsible uses of ML/AI would look like in the context of research management and assessment;
- Identifying an agenda for further work through RoRI on these issues, linked to our broader work-stream on randomisation and experimentation.