

**DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INNOVATION
COMMITTEE FOR SCIENTIFIC AND TECHNOLOGICAL POLICY**

OECD Global Science Forum

GSF-NESTI Workshop on Reconciling Scientific Excellence and Open Science

What do we want out of science and how can we incentivise and monitor these outputs?

OECD Headquarters, 9 April 2018

This workshop agenda along with the workshop's conclusions will be discussed under Item 10b of the agenda of the 38th meeting of the Global Science Forum. This workshop immediately precedes the GSF plenary meeting, which will be held on 10-11 April 2018 at OECD Headquarters in Paris.

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Global Science Forum (GSF)-NESTI¹ Workshop

Reconciling Scientific Excellence and Open Science: What do we want out of science and how can we incentivise and monitor these outputs?

9 April, 2018, OECD

Objectives

1. The objective of this workshop is to explore what we want out of public investment in science in the new era of Open Science and what might be done from a policy perspective to incentivise the production of desired outputs. To this end, different actors who are already engaged and interested in this area will be asked to address three over-arching questions:

1. What are the desirable (shorter-term) outputs and (longer-term) impacts that we expect from Open Science and what are potential downsides?
2. How can scientists and institutions be incentivised to produce these desirable outcomes and manage the downsides?
3. What are the implications for science monitoring and assessment mechanisms?

2. The focus of the workshop is on Open Science and the public research enterprise. Open science is considered in its broadest sense and refers to efforts to make the scientific process more open and inclusive for all relevant actors, within and beyond the scientific community, as enabled by digitalisation. In this context the impacts of science on (social and technological) innovation are included but the downstream processes and assessment of innovation in firms and the public sector is not a major focus.

3. The workshop will contribute to extending the dialogue between policy makers, the academic community and users and providers of data initiated at the 2016 [OECD-NESTI Blue Sky Forum](#) on the future monitoring and assessment of science policies. The Forum explored recent developments and highlighted the transformations induced by the digitalisation of scientific processes which enable the use of new data sources and analytical tools. These can open the way for a more balanced assessment of research and its impacts but may also have unintended consequences. The workshop will help inform future database and indicator development as well as provide input to the OECD-CSTP project on the Digitalisation of Science and Innovation Policies and Governance.

Context

4. There are many expectations for Open Science, ranging from accelerated discovery and innovation to increased public trust, and there are also potential risks ([OECD, 2015](#)). In order to realise these positive expectations, new scientific practices will need to be actively promoted and mainstreamed. The three pillars of Open Science - open access to scientific information, open data and open engagement with society (including firms) - all require changes to traditional scientific processes and behaviours that need to be supported by policy mandates and appropriate incentive, monitoring and reward systems. Underpinning these pillars, there are different views as to what represents scientific excellence, particularly from a societal perspective, and discussion as to how openness and excellence should reinforce (rather than contradict) each other.

5. Different fields of research are currently at different stages of embracing various aspects of Open Science. Open access to electronic preprints is now standard in physics, maths and astronomy; genome sequencing data and analysis services are openly available to all biologists; engagement of patient groups

¹ NESTI: CSTP Working Party of National Experts for Science and Technology Indicators

is standard practice in many areas of health research and citizens have a long history of participation in environmental data collection. However, despite these examples, there is still a long way to go before the opportunities of digitalisation are fully embraced and Open Science becomes a reality.

6. One of the main obstacles to realising this vision is the apparent lack of effective incentives and rewards for adopting open science practices. In fact, given the common perception of scientific research today as being hyper-competitive and narrowly focused on excellence, it could be argued that the way we currently measure and value scientific performance (at the individual, institutional and national scales) is a disincentive to Open Science. There is widespread concern that current STI indicators, in particular the use of bibliometrics and proxy measures of scientific excellence and innovation, may be distorting scientific behaviour.

7. Whether used in isolation or as an adjunct to traditional peer review, quantitative measures have an enormous influence on policy choices and influence the shape of science systems and the behaviour of those that function within these systems. Whilst a judicious choice and use of such measures can effectively promote good and open science, the wrong choices or poor application of indicators can have the opposite effect. The concerted push for Open Science provides an opportunity to look again at what we really want and expect out of public research and how we can incentivise and monitor these desired outputs.

Workshop Agenda

8.30-9.00: Registration and coffee

9:00-9:15

Introduction

Welcome from Co-Chairs, Gabriele Fioni (GSF) Svein Olav Nås (NESTI)

Secretariat to briefly introduce the workshop aims and structure

9:15-10:00

Session 1. Scientific excellence through open science or vice versa? What is excellence and how can it be operationalised in the evidence and policy debate?

Scientific excellence is a poorly defined concept but it is widely accepted as being the most important characteristic of 'good' publically funded science. The quest for scientific excellence and the way we measure and incentivise this is probably the major determinant of how science systems are organised and function. Whilst peer review is commonly used to assess excellence, for example in research proposals or promotion panels, this is normally supplemented by the use of bibliometric measures. These objective measures are also increasingly used in comparative analyses of scientific performance at very different levels of aggregation, from countries to individuals. What is more, they are also used as performance targets or to inform mechanisms for allocating scarce resources. Proxy measures of scientific excellence, including citation indices, journal impact factors and individual H indices, are all derived from journal publication records. The result of using these measures in performance assessment is that scientists are motivated to publish more often and in higher impact journals. Whilst this could in principle be a good thing, in practice the 'pressure to publish' is considered to be a major contributor to some of the negative aspects of public science, including short-termism, conservatism and lack of rigour. Moreover, the

emphasis on publication in high impact journals - few of which are open access - has a negative impact on efforts to promote open science.

This opening plenary will introduce key issues around how scientific excellence is currently conceived and monitored how this might be reconsidered in an era of Open Science and potentially redefined in relation to broader outputs than scientific publications.

2 Plenary Speakers (2x15mins + 15min Q&A)

1. Paula Stephan (Georgia State University, USA)
 2. Richard Gold (McGill University, Montreal, Canada)
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10:00-11:15

Session 2. Open access publication and dissemination of scientific information

As introduced in the previous session, publications in scientific journals and associated indicators of excellence have been the main way in which scientific performance has been monitored to date. However, the whole field of scholarly publication is being transformed by digital technologies, enabling scientific information to be disseminated more widely and to new audiences at no additional cost. It is not surprising that promoting open access publication has become a major policy focus. Publication in open access journals has been mandated in many countries, which, given that most high impact journals are not open access, immediately raises questions about traditional methods for monitoring and incentivising scientific excellence.

The traditional journal publication system has in many ways served the science community well, ensuring the quality of scientific publications and the continuity of the scientific record as well as providing a source of income for scientific societies and publishers. However, scientific publication is changing rapidly and already, in some disciplines, publishing papers in peer-reviewed journals is no longer the main mechanism for communicating scientific results. In the digital age, the traditional publish or perish disjunctive is morphing into managing a digital identity in ways that can enable tracing of multiple activities and accomplishments that can be credited by scientific reward systems. This ongoing transition, including the development of new models for the quality assurance, publication and dissemination of scientific information provides both new opportunities and challenges for science.

In the broader context of Open Science, it is timely to re-consider the overall objectives of scholarly publication and dissemination of scientific information for various stakeholders. There are fundamental questions not only about how to improve current bibliometric and associated altmetric measures but also about how to capture, and what value to attach, to new avenues for disseminating scientific information, including social media.

Key questions:

- How can the 'publish or perish' culture be corrected and what is the role of incentives and metrics?
- What new science information outputs do we value and how can these be incentivised?
- How can incentives be used to promote open access to publicly sponsored research outputs?
- What are the potential trade offs between open access to more and new forms of scientific information and traditional peer-reviewed scientific publications?
- Is there a role for altmetrics - what are their benefits and limitations?

3 presenters (3x15mins followed by 45 min discussion)

1. Rebecca Lawrence (Faculty of 1000)
2. Vincent Tunru (Flockademic, Netherlands)
3. Kim Holmberg (University of Turku, Finland)

11:15-11:45 Coffee Break

11:45-13:15

Session 3. Open research data: good data management and data access

Increased sharing and open access to research data (both data used for research and data produced by research) is expected to improve both the efficiency and effectiveness of scientific research and innovation. Providing access to the data that underpins published scientific results is seen as one way of addressing the reproducibility crisis in science. Big data, coupled with artificial intelligence, is providing new and powerful methods for discovery. Integrating data across different domains is seen as essential for addressing complex societal challenges. However, ensuring sustainable access to useful (Findable, Accessible, Interoperable, Reusable) research data requires investment in both physical and human infrastructure, as well agreement and adoption of common standards and protocols. In many research domains it also requires a shift in scientific culture - from a culture of hoarding data to one of sharing.

GSF has recently completed [several open-data related activities](#) that have focussed mainly on data repositories and networks. A recurrent issue in this work has been the lack of incentives for scientists to share their data and the lack of recognition and career structures for those involved in data curation and stewardship. A number of international bodies, including CODATA, Force11 and the Research Data Alliance, have done foundational work on unique identifiers for datasets, data publication and citation, which can provide a basis for tracking, incentivising and measuring data deposition and impact but this has not yet been translated into a consistent framework for promoting open data practices. Several science publishers include open access to the research data that supports scientific findings as a condition for article publication. A number of data journals, which publish peer-reviewed data sets, have also recently emerged, although their focus is on key data sets that represent only a very small fraction of the total volume of research data.

Key questions:

- What incentives are necessary to encourage scientists share data more openly?
- How can the essential contribution of skilled professionals 'supporting' research in a variety of data stewardship and analysis roles be properly acknowledged?
- What system of scholarly communication will best advance the open availability and reusability of research data and the vision of Open Science?

3 speakers (3x15mins followed by 45min discussion)

1. Simon Hodson (CODATA)
2. Fiona Murphy (Fiona Murphy Consulting, UK)
3. Jeff Spies (Centre for Open Science, Virginia) [via video-link]

13:15-14:30 Lunch

14:30 - 16:00

Session 4. Societal engagement

The third pillar of Open Science is societal engagement. Ensuring open access to scientific information and data, as considered in the previous sessions, is one way of enabling societal engagement in science. Greater access to the outputs of public research for firms is expected to promote innovation. However, engaging with civil society more broadly to co-design and co-produce research, which is seen as essential to address many societal challenges, will almost certainly require more pro-active approaches.

Incentivising and measuring science's engagement with society is a complex area that ranges across the different stages of the scientific process, from co-design of science agendas and citizen science through to education and outreach. There are many different ways in which scientists and scientific institutions engage with different societal actors to informing decision-making and policy development at multiple scales. Assessing the impact of such engagement is difficult and is highly context and time dependent.

GSF is doing some work on developing a framework for assessing the socio-economic impact of research infrastructures and there has been work done in NESTI looking at potential indicators of the impact of science on different societal actors. Several OECD countries have developed mechanisms for describing impact pathways and assessing social impacts of science as part of broader research assessment exercises.

Key Questions:

- What do we desire in terms of short and long-term outputs and impacts from societal engagement?
- How can various aspect of scientific engagement be incentivised and monitored?
- What are the necessary skills and competences for 'citizen scientists' and how can they be developed and rewarded?
- How does open science contribute to accountability and trust?
- Can altmetrics help in assessing societal engagement?

3 speakers (3x15mins followed by 45min discussion)

1. Kazuhiro Hayashi (NISTEP, Tokyo, Japan)
2. Muki Haklay (UCL, London, UK)
3. Cecilia Cabello Valdes (Foundation for Science and Technology, Madrid, Spain)

16:00 - 16:30 Coffee

16:30- 18:15

Session 5. Scientific Excellence re-visited

This session is an opportunity to return to where the workshop began and, in the light of the day's discussions, re-examine how scientific excellence can be embedded across the three main pillars of Open Science and what this might mean in terms of incentives and monitoring.

2 Speakers: 2x15mins followed by 20min discussion

1. Richard Gold (McGill University, Montreal, Canada)
2. David Carr (Wellcome Trust, London, UK)

Open Discussion (50mins)

What can OECD (GSF, NESTI or other bodies) do to take forward this agenda?

Going round the table, all workshop attendees (experts and delegates) will be invited to give their reflections on future priorities (2 mins each).

Concluding comments from meeting co-chairs, Gabriele Fioni and Svein Olav Nås (5mins)