The future of science is open
Rationale, goals and milestones of the EU policies

COIMBRA
High Level seminar on research policy
Venice
7-12-2018

Jc. Burgelman
HoU Open Science, DG RTD
The nature of science (modus operandi) is changing from a closed system to an open, sharing one.
We embrace, support and enable the principles of Open Science
(Source, Ron Mobed, CEO Elsevier, meeting Brussels 11-2018)

Elsevier partners with the research community to empower open science. Working together, we can achieve a more inclusive, collaborative and transparent world of research. We believe open science can benefit research and society and drive research performance. Here are some of the ways in which we are supporting open science.

There are more options for researchers to share more kinds of research outputs than ever before. We support a more open and inclusive research experience through our journals, tools and platforms.

We are helping raise the bar on reproducibility, enabling researchers to share their methods and data and to gain more complete insights into research performance.
It offers great opportunities for science, scientists, and society.

- **Better ROI of the R&I investments**: Self-evident: if all the results of our public research are made reusable, it will follow that better use is made. Norori: Eco impact Human Gnoom sequencing: 1 billion eco output, 4 million jobs, 30% more genetic testing, innovative new methods, cures etc.

- **Faster circulation of new ideas**: We have 22 million EU SME's that will have access to top-notch research without having to significantly pay for it!

- **More transparency of the science system**: The public taxpayer has this right.

- **Fit for 21st century science purpose**: All grand societal challenges need cross-disciplinary research.
"As I see it, European success now lies in sharing as soon as possible, (...). The days of open science have arrived."

Speech at "Presidency Conference Open Science", 04 of April, 2016, Amsterdam
2016 - Holistic Policy Agenda: scope & ambitions

... 4 with regard to the use & management of research results and data

✓ **Open Data**: FAIR data sharing is the default for funding scientific research

✓ **Science cloud**: All EU researchers are able to deposit, access and analyse European scientific data through the open science cloud, without leaving their desk

✓ **Altmetrics**: Alternative metrics (next generation metrics) to complement conventional indicators for research quality and impact (e.g. Journal Impact Factors and citations)

✓ **Future of scholarly communication**: All peer reviewed scientific publications are freely accessible
... 4 with regard to relations with research actors (researchers, institutions and funders)

- **Rewards**: The European research career evaluation system fully acknowledges Open Science activities.
- **Research Integrity**: All publicly funded research in the EU adheres to commonly agreed Open Science Standards of Research Integrity.
- **Education and skills**: All young scientists in Europe have the necessary skills and support to apply Open Science research routines and practices.
- **Citizen Science**: CS significantly contribute and are recognised as valid knowledge producers of European science.
Extensive stakeholder consultation
✓ Public consultation (July-September 2014)
✓ Validation workshops (October-December 2014)

Strong support by Member States and Competitiveness Council
✓ Policy debate & Council conclusions 'data-driven economy' May 2015
✓ Presidency conference Open Science &
✓ Council conclusions 'open science') May 2016

European Open Science Agenda
✓ Broad consensus on five policy lines and 8 Actions
✓ Open Science Policy Platform
✓ Embedded in the Digital Single Market strategy
Milestones...
The evolution of open access in the EU funding programmes for R&I

**2008**
- **FP7**
  - OA **Pilot**
  - Deposit and open access

**2014**
- **H2020**
  - OA **Mandatory**
  - Deposit and open access
  - & ORD/DMP **Pilot**

**2017**
- **H2020**
  - OA **Mandatory**
  - Deposit and open access
  - & ORD/DMP **by default (opt-out)**

**2020**
- **Horizon Europe**
  - OA **Mandatory**
  - Deposit and open access
  - DMP + FAIR data
  - OD **by default (opt-out)**
  - & Open Science **embedded**
AS OPEN AS POSSIBLE, AS CLOSED AS NECESSARY

Top three reasons for **opt-out:**

- Privacy
- Intellectual property rights
- Might jeopardise project's main objective
Policy focus now

Open access to publications (2018/19)
- Implement Plan S
- Increasing uptake to 100% (incentives, 'sanctions')
- Launch ORE

Open access and research data (2018/19)
- Launch EOSC
- Mainstreaming FAIR data (and DMP) across the FPs

Citizen Science (2019)
- Pan European agreement on uptake

Metrics, Incentives, Rewards (2019)
- Next generation metrics
- "Bucharest" Declaration
- Funding for OS skills/approaches

Make HEurope an open science programm (2020)
The Open Research Europe publishing platform

• Help H2020 beneficiaries and their researchers comply with the open access mandate without paying APCs during and after the grant
• Improve uptake of OA in H2020
• Promote OA as THE mode for publishing from now on
• Support open science and lead by example
  ✓ Early sharing of research (pre-prints + peer-reviewed articles)
  ✓ Open peer-review + post publication commenting
  ✓ New generation metrics
• Explore business models in OA publishing and sustainability
• Tenders are under evaluation
cOAlition S

Group of national research funding organisations committed to implement Plan S, which consists of one target and 10 principles.

Main target: “After 1 January 2020 scientific publications on the results from research funded by public grants provided by national and European research councils and funding bodies, must be published in compliant Open Access Journals or on compliant Open Access Platforms.”

cOAlition S members (29/11): 13 national research funding organisations and 3 charitable foundations from 13 countries + support statements from numerous actors (EUA, LERU, DFG, FNSNF, YERUN, EURODOC, LIBER, ...).
Launch of Plan S
September 4, 2018

Guidance on implementation + public consultation
November 27, 2018

End of public consultation
February 1, 2019

Formal review of Plan S effects
2023

Public statement by Commissioner Moedas welcoming and supporting Plan S and cOAlition S +
public statement by the ERC SC supporting Plan S

EC+ERC participation in the cOAlition S Task Force drafting the Guidance

Supported by
Immediate publication in « compliant » journals or platforms. Immediate open access via « compliant » repositories.

No funding of publication in hybrid journals (but publication in hybrid journals is accepted). If the journal is covered by transformative agreements funders can decide to fund publications fees but only for a transition period.

Full copyright retention by authors/their institutions and publication under an open license allowing for re-use for any purpose, subject to proper attribution of authorship.

Copyright retention and open licenses are key for the re-usability of research data, TDM, ....
The Guidance clarifies and « softens » some of Plan S principles

- Capping and standardisation of publication fees => independent study to be commissioned by cOAlition S

- Green OA => accepted as long as there is no embargo, copyright retention, CC-BY license, and « compliant » repository

- Publication in hybrid journals => accepted during a transition period although publication fees will not to be funded. If the journal is covered by « transformative agreements », funders can decide to fund

- End of the subscription-based model as goal (Preamble to Plan S) => « cOAlition S calls for a definitive shift towards new models of academic publishing »
**Open Access publishers are top cited (2015-2017)**

Average citations to articles published in 2015, 2016, 2017

<table>
<thead>
<tr>
<th>Publisher</th>
<th>Average citations</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Chemical Society</td>
<td>6.59</td>
</tr>
<tr>
<td>Royal Society of Chemistry</td>
<td>5.01</td>
</tr>
<tr>
<td>American Physical Society</td>
<td>3.79</td>
</tr>
<tr>
<td>Frontiers</td>
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<tr>
<td>Oxford University Press</td>
<td>3.64</td>
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<tr>
<td>PLOS</td>
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<tr>
<td>Elsevier</td>
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<tr>
<td>MDPI</td>
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<tr>
<td>Wiley</td>
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</tr>
<tr>
<td>Springer Nature</td>
<td>2.35</td>
</tr>
<tr>
<td>BMJ Publishing Group</td>
<td>2.16</td>
</tr>
<tr>
<td>IEEE</td>
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<tr>
<td>Wolters Kluwer</td>
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<tr>
<td>IOP Publishing</td>
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<tr>
<td>Sage</td>
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<tr>
<td>American Institute of Physics</td>
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<tr>
<td>Hindawi</td>
<td>1.65</td>
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<tr>
<td>Taylor &amp; Francis</td>
<td>1.38</td>
</tr>
<tr>
<td>Cambridge University Press</td>
<td>1.37</td>
</tr>
<tr>
<td>Walter de Gruyter</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Source: Scimago (2018). Data based on 20 top publishers by volume in 2017. Total document and citation counts are for the 3-year period ending 2017. Publisher and business model assignments based on Scopus, DOAJ and official journal listings on publisher websites. More info and full dataset: [https://blog.frontiersin.org/2018/07/11/scientific-excellence-at-scale-open-access-journals-have-a-clear-citation-advantage-over-subscription-journals/](https://blog.frontiersin.org/2018/07/11/scientific-excellence-at-scale-open-access-journals-have-a-clear-citation-advantage-over-subscription-journals/)
Open Access journals get more cites across publishers

Source: Scimago (2018). Data based on 20 top publishers by volume in 2017. Total document and citation counts are for the 3-year period ending 2017. Publisher and business model assignments based on Scopus, DOAJ and official journal listings on publisher websites. More info and full dataset: https://blog.frontiersin.org/2018/07/11/scientific-excellence-at-scale-open-access-journals-have-a-clear-citation-advantage-over-subscription-journals/

* Source: K. Makram, enabling the OS modus operandi in Europe. Frontiers 29-11-2018
EOSC will allow for universal access to open research data and create a new level playing field for EU researchers

- Easy access through a universal access point for ALL European researchers
- Cross-disciplinary access to data unleashes potential of interdisciplinary research
- Services and data are interoperable (FAIR data)
- Data funded with public money is in principle open (as open as possible, as closed as necessary)

Seamless environment and enabling interdisciplinary research

Source: RTD
EOSC: launched 23-11-2018

The European Open Science Cloud Launch Event

23 November 2018,
10:00 – 13:30 hrs
University of Vienna Library, main reading room
The EOSC Governance

Three layer structure

- **EOSC Board** of MS/AC and EC representatives to ensure effective supervision of EOSC implementation

- **Working Group of the strategic configuration of the Programme Committee**

- **Executive Board** of stakeholder representatives to help ensure proper EOSC implementation and accountability

- **Commission expert group**

- **Stakeholder Forum** to provide input from a wide range of actors

- **Self-organised with EC support**
The EOSC Executive Board

**Chair** Karel LUYBEN – Representative of CESAER, supported by ALLEA and EUA

**Vice Chair** Cathrin STÖVER – Representative of GEANT

**Organisations and their representatives**

1. CESAER represented by Karel LUYBEN
2. CESSDA ERIC represented by Ronald DEKKER
3. EMBL represented by Rupert LÜCK
4. European Spallation Source ERIC represented by John WOMERSLEY
5. GÉANT represented by Cathrin STÖVER
6. OPENAIRE represented by Natalia MANOLIA
7. Research Data Alliance (RDA) represented by Juan BICARREGUI
8. Science Europe represented by Stephan KUSTER

**Individual experts**

1. Sarah JONES
2. Jean-Francois ABRAMATIC
3. Jan HRUSAK
Open science offers opportunities for citizens and scientists together to step up their contribution to science to a scale unthought of even a decade ago.

Barriers and challenges still prevent citizen science from living up to its full potential (OSPP).

**Goal:** **Ensure maximum recognition and impact of citizen science:**

- Laying out a long-term vision for citizen science in Europe as part and parcel of open science
- Development of guidelines, toolkit or protocol(s) that can be applied across scientific disciplines to ensure, in particular, maximum recognition and use of the data produced by citizen science.
- Have all funders, research performing organizations and universities to agree on it (in co-development)
Recommendation OSPP (input: # Expert groups)

- **Quantitative and qualitative indicators** need to be identified and developed for research assessment that captures the full range of contributions to the knowledge system (e.g. context, discipline dependent).
- Display a broad range of indicators for all research outputs.
- Indicators have to match Rewards for Open Science.
- Do **not use journal brand or IF** for individual researcher assessment as proxy for quality.
- Apply **ORCID** and develop best practices.
• By January 2019 EG proposes set of generic OS indicators PLUS how to calibrate this over different research trajectories (frontiers, mission oriented etc.)
• Buy in of OSPP
• Before Summer 2019: have University associations and Funders agree on it (‘‘Bucharest declaration’’)

Let’s complement the DORA declaration (‘‘what we don’t want’’) with a declaration that states what we do want as indicators for the future!
FP9 goes beyond OA (publications & data) to embrace & incentivise Open Science as modus operandi for science

- Clarifies and strengthens the **OA obligations**;
- **Empowers the authors** of scientific publications;
- Is home of **FAIR data sharing** while complying with IPR rules and exploitation obligations set in the GA;
- **Broadens Open Access** (with opting out options) to other research output;
- Promotes compliance with *'Open Science principles'* through a combination of obligations and incentives;
- Implements **sanctions** for those beneficiaries that repeatedly and consistently fail to provide the required open access, requiring institutions to assume responsibility for their intellectual output;
- Introduces the use of *'new generation' metrics* for better assessing the impact of research output and the engagement in Open Science.
Let’s not be complacent - the journey only started
• Due to the power of cyber science tools, it is quite realistically to assume that we will evolve from peer reviewed open access publications to: **peer reviewed open access research workflows**

• Implied that scientific publishers become **open science platforms** in which an article is ONE of the many products (and not even not per se)

• When launching the Chan Zuckerberg Foundation (goal: eliminate all diseases by 2100) its director Cori Bargmann stated (1-2018):

"Finally, on openness. We believe that research advances when people build on each others’ work. So our principles include making data, **protocols, reagents and code** freely available for other scientists to use" (my underlining) [https://www.nature.com/articles/d41586-017-08966-z](https://www.nature.com/articles/d41586-017-08966-z)
Data explosion (“Here’s the evidence, now what is the hypothesis?”)

• A 4\textsuperscript{th} model of science in the making?

<table>
<thead>
<tr>
<th>Paradigm</th>
<th>Manual</th>
<th>Computational</th>
</tr>
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<tbody>
<tr>
<td>Deductive</td>
<td>2\textsuperscript{nd} paradigm: theoretical \textit{(Newton)}</td>
<td>3\textsuperscript{rd} paradigm: computational \textit{(Von Neumann)}</td>
</tr>
<tr>
<td>Inductive</td>
<td>1\textsuperscript{st} paradigm: empirical \textit{(Bacon)}</td>
<td>4\textsuperscript{th} paradigm: data-intensive \textit{(Venter, DNA sequencing)}</td>
</tr>
</tbody>
</table>

• Epistemology and critical thinking back at the heart of every discipline
By 2030 one can assume that the science system to be:

- Completely data driven (AI!)
- With open research data as a renewable resource for research and innovation (via EOSC)
- Full & immediate open access to the whole life cycle of a research process
- "liquid" science (like in SW development)
- Multiple ways to measure and reward scientific productivity and impact

Allowing reproducible research, full cross disciplinary set up and faster take up
What won't change by 2030

By 2030 Independent Quality assurance via peer review will still be the core mechanism to progress science
To conclude

Open Science is here to stay:

If you want to go fast, go alone.
If you want to go far, go together

(African saying)
Thank you!

More information at
http://ec.europa.eu/research/openscience

OS monitor
http://ec.europa.eu/research/openscience/monitor/