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LIBSENSE event

Gaborone, 23 November 2022

Open Science: what's next?

Science in transition

- Collaborative
- International
- Digital

- Re-inventing discovery

- Truths and post-truths

- *Is the system fit-for-purpose?*
- *Can a developing country leapfrog?*

Some challenges for science today

- Narrow perceptions of quality
- Hyper-publishing and hyper-authorship
- Loss of control of scientific production (publishing);
- Closed access
- Fight for funding
- Obsession with rankings
- Reproducibility, replicability
- Risk-averse research
- Wasting (data) resources, repeating doomed research
- Gaming the system
- Lack of equity and inclusion
- Focus on 'stars' – not on collaboration

Is this the culture we want?

The root obstacles to change

- Culture
 - Papers vs. impacts
 - Outputs vs. Process
 - Integrity
 - Assuming responsibility
- Rewards and incentives system
- Enabling infrastructure

Towards a new *modus operandi* for Science

Current System (dominant)		Open Science	
Excellence defined largely on the basis of <i>where</i> scientists publish		Composite definition of excellence	
Incentivises researchers to produce specific outputs (<i>mainly publications</i>) and to publish as much and as fast as possible (<i>publish or perish!</i>)	Use of quantitative metrics	Incentivises researchers to share knowledge/data early and openly, to collaborate, and to increase quality and impact; While considering diversity of outputs and research cultures	Use of qualitative and quantitative metrics
Rewarding individual competing scientists - gaining scientific prestige		Rewarding team work, collaboration and sharing to achieve societal impact (e.g. Covid-19)	

Is Open Science (part of) the answer?

Open science: sharing knowledge, data and tools as early as possible in the research process in open collaboration with all relevant knowledge actors

Open science can increase

- **Quality & efficiency of R&I**, if all the produced results are shared, made reusable, and if collaboration, reproducibility and openness are rewarded
- **Creativity**, through collective intelligence and enabling cross-disciplinary research that does not require laborious data wrangling
- **Trust** in the science system, engaging both researchers & citizens

Has COVID-19 accelerated a long-term shift?

Broad consensus that **Open Science accelerates scientific discovery** and that FAIR and open data can save lives

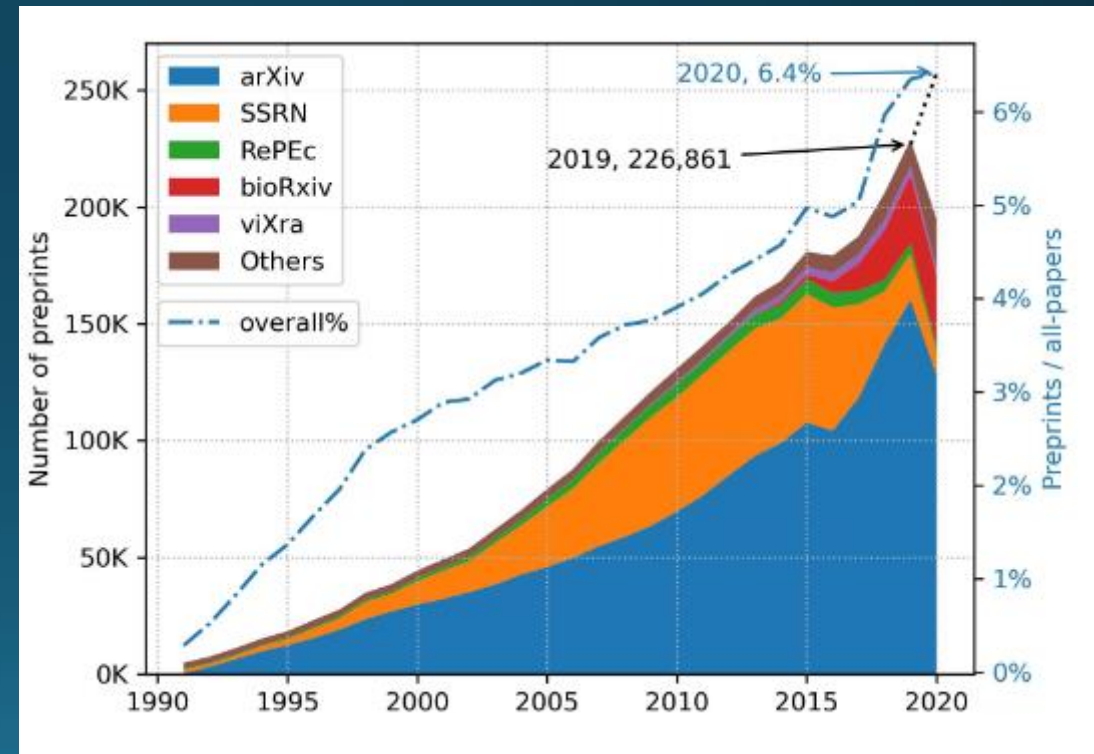
Some positive trends:

- Early and fast share of results through increased use of preprints
- Publishers temporarily opening up some of their publications (although not permanently)

But challenges remain, such as:

- Most open access papers (even COVID-19 ones) do not make their underlying data available without restrictions
- Research data not fully interoperable and reusable

Annual number of preprints/all-papers rate growth



Source: [arXiv:2102.09066v1](https://arxiv.org/abs/2102.09066v1)

Scholarly communication: Some data

- 16,780 publishers in 2021 (x10 since 2000) publishing around 121,700 journals
 - 71% publish a single title
 - 10 publishers publish 47% of articles
- 28 B\$ expected revenues in 2023
- 89% digital (2020), libraries budgets shrinking
- 50-70% of papers behind paywalls
- 12% of industry revenues from APC OA but rising fast (~12% annually)

Sources:

deltathink.com/news-views-open-access-market-sizing-update-2020/

zenodo.org/record/4046624#.YoAnjHZByUk (SPARC Europe study)

www.nature.com/articles/d41586-022-00216-1

journals.plos.org/plosone/article?id=10.1371/journal.pone.0166387

www.nature.com/articles/533452a

[STM Global Brief 2021-Economics and Market size](#)

Scholarly communication: the issues

- **Open Access**

- Most publications behind paywalls (not OA: 50-70%)
- Loss of copyright (~50% subscription journals require transfer; ~60% OA journals allow authors to hold without restrictions)

- **Slow, wasteful system**

- Cascading submissions and exploding review demand (10% growth rate, up from 4-5%; 20% of researchers contribute 69-94% of reviews of which 70% dedicate <1% of their time)

- **Lack of transparency**

- Impact on quality, reproducibility and trust (>70% fail to reproduce others' experiments, 50% fail to reproduce their own!)

- **Publish or perish**

- Tyranny of JIF
- Lack of reproducibility and rigour
- Innovation? Too risky!

- **Cost!**

Institutional/diamond publishing

- **Mission-based not-for-profit open access publishing activities, non-APC based**
 - By universities and other research institutions, funders or bodies of public interest
- **An ocean of publishing initiatives, large and small across the world**
 - All fields of science, all languages
 - HSS a pioneer
 - Various funding models
- **These publishing outlets, usually journals, form a sizeable portion of all available journals and 2/3 of the open access articles**
 - 10/14K journals in DOAJ i.e. 73% does not require APCs
 - But: they publish 356,000 articles per year vs 453,000 compared to the APC journals in DOAJ
 - Largely in the SSH
- **The publishing system and publishing practices can be further diversified, consolidated and improved**

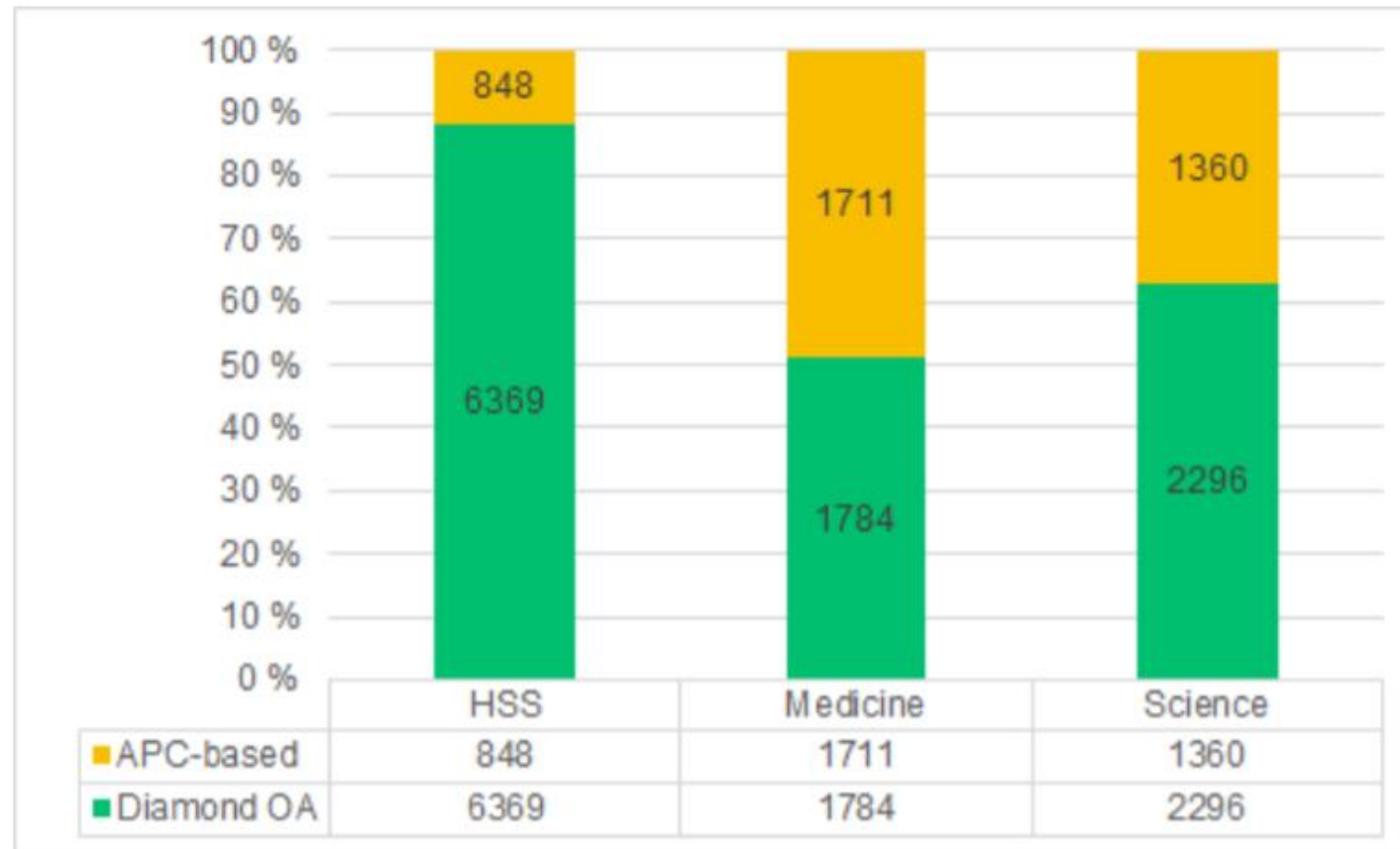


Figure 14. Journals by funding models for the three disciplinary groups. Source: DOAJ and GOA(5)

Source: Bosman, Jeroen, Frantsvåg, Jan Erik, Kramer, Bianca, Langlais, Pierre-Carl, & Proudman, Vanessa. (2021). OA Diamond Journals Study. Part 1: Findings. Zenodo. <https://doi.org/10.5281/zenodo.4558704>

The contribution of Diamond OA to the communication of science

4. Diamond OA should regain its place in research assessment

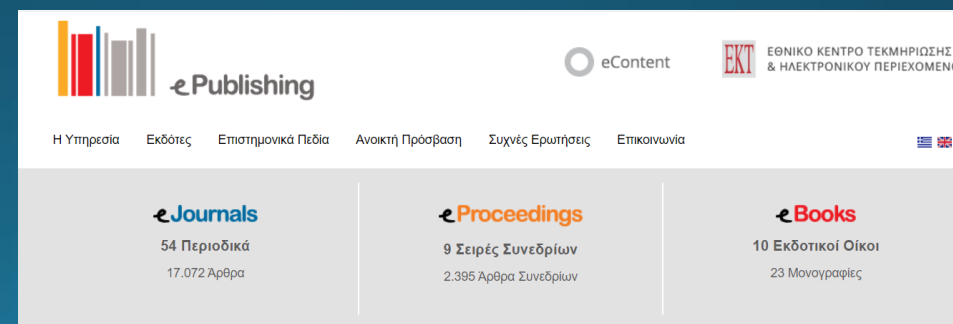
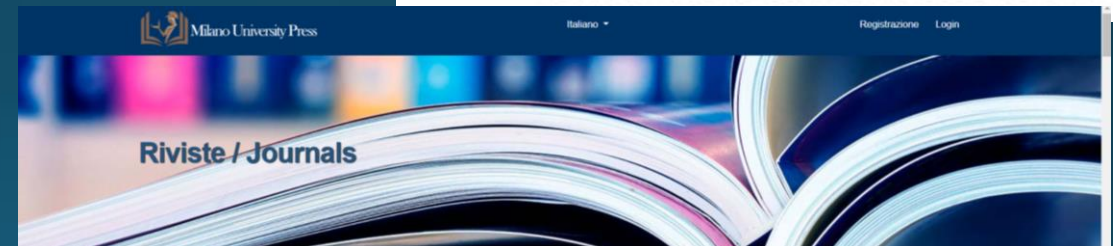
- Data normalization
- Available data sources for comprehensive research assessment
- Quantitative indicators
- Qualitative views of its contribution to the communication of science

The contribution of Diamond OA to universities and countries in the dissemination of science must not be ignored when commercial solutions are being negotiated.

Map of co-authorship in diamond OA journals (1.9 million author records)
Source: Redalyc 2022

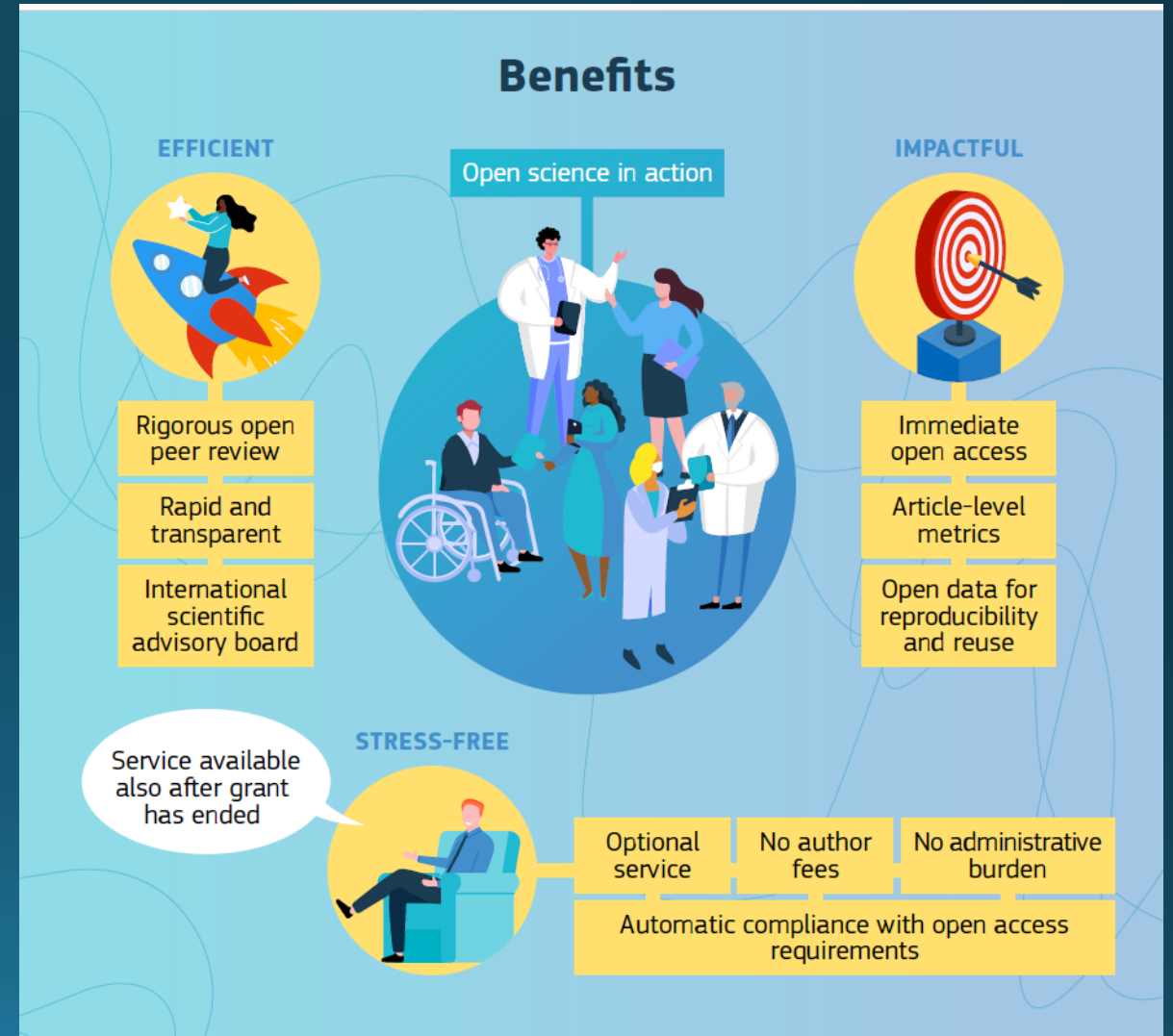
Examples of reports and services in EU

- 'Future of Scholarly Publishing and Scholarly Communication', report of expert group (2019)
- Reports by cOAlition S, Open Research Central
- 'Action Plan for Diamond Open Access' (2022), Commission-funded DIAMAS project
- <https://journal.fi>
- <http://epublishing.ekt.gr>
- <https://operas-eu.org>
- <https://hrcak.srce.hr>
- <https://riviste.unimi.it/>
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Open Research Europe

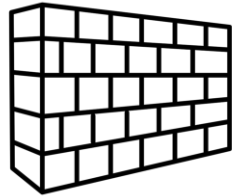
- A peer-reviewed publishing platform (not a repository)
- Optional service for Horizon Europe beneficiaries at no cost to them
- Post-publication peer-review model: publish first (=early+ open sharing) and review after in open review (transparency)
- Publication and review reports open access under CC BY licenses (transparency, open content)
- Launched end March 2021; > 300 publications
- Vision beyond 2024: A pan-European publishing service?



Climate change, and the resulting harm to our global biodiversity, is one of the world's most pressing challenges

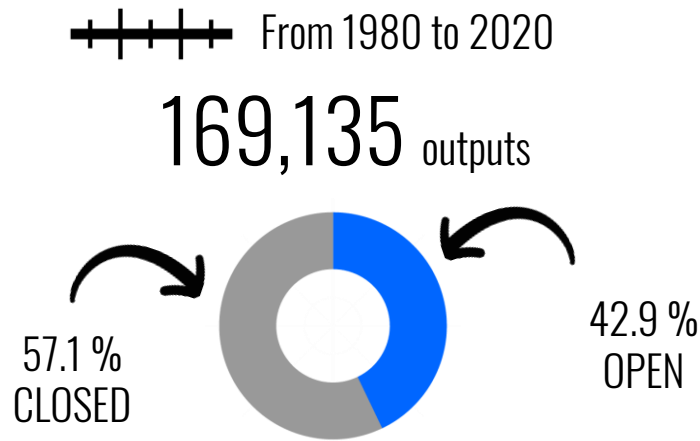
IF WE ARE GOING TO SOLVE THE WORLD'S GREATEST CHALLENGES, **THE KNOWLEDGE ABOUT THEM MUST BE OPEN**

HOWEVER,



Open sharing of research outputs is not the default

Only about **43%** of climate change publications are open.



OPEN IS WORKING TO MAKE THE **OPEN**
CLIMATE **SHARING** OF RESEARCH
CAMPAIGN OUTPUTS THE NORM IN CLIMATE
SCIENCE

Source: COKI Climate Dash Demo

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Goals to make open sharing of research outputs the norm in climate science.

1. Campaign messaging
2. Where are we at now on OA
3. Identify legal and policy barriers
4. OA Policies - Government
5. OA Policies- Funders
6. OA Policies - Environmental Organizations
7. Inclusion in international frameworks
8. Secure endorsements
9. Collaborations with traditionally excluded voices in open knowledge
10. Unbinding closed research
11. Special priority for climate and biodiversity research



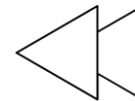
Information in and out.



Work hand-in-hand with funders of research



Make this an international campaign



Open past publications too



We are looking to work directly with national governments to develop open access policies to enable the open sharing of climate change and biodiversity research.

The Open Climate Campaign will dedicate specific resources to help you create, adopt and implement equitable open access policies

We also offer training on how to add openly licenses to your research assets so others may freely use them, communicate your open assets on your website, update your terms of service, and advertise your open research.

European Research Data Landscape

European Commission study, ~40 countries, sample of ~15,000 researchers (2022)

Findings:

- Volume: exabytes, growing
- Storage in repositories: 40% of researchers occasionally, 22% currently
- Size of repositories: only 8% hold >1 PB
- FAIR principles: 31% of researchers familiar, 18% put them in practice
- FAIRness of datasets: 55% score (F-UJI)
- Strongest influence: institution's policy, national policy, community norms
- Key challenges: Digital and data management skills (particularly in HSS); lack of data stewards

10 B€ lost annually in Europe due to lack of FAIR! (2016 study)

What can national governments/authorities do?

Improve *the practice* of R&I (by mandates and evaluation)

- Open access to scholarly publications; new publishing models
- Early sharing of all research outputs
- All data FAIR with RDM
- Reproducible results
- Expand notions of integrity
- Encourage societal engagement and responsibility

Develop proper *enablers*

- Develop Open Research Infrastructures (including for communication, data, computing and publications)
- Improve legal and regulatory environment for data and copyright
- Finance appropriate services, skills and education, including for data, IT and research integrity
- Support the reform of rewards & incentives to adopt better academic practices, with appropriate metrics

Finance not just R&D but an efficient research system!

Research Data Management (RDM)

Example of what a funder can mandate or assess (from Horizon Europe)

- RDM in line with FAIR
- Data Management Plans
- OA via repository under CC-BY or CCo; metadata under CCo;
- Exceptions to OA possible ('as open as possible, as closed as necessary')
- Info about software and tools needed to reuse or validate data

What can Universities and research institutions do?

Improve *the practice* of R&I (by University policy)

- Open access to scholarly publications
- Early sharing of all research outputs
- All data FAIR with DMPs (data management plans)
- Participate in national, regional and global efforts
- Reach out and involve local society

Develop proper *enablers*

- Provide adequate digital infrastructure
- Ensure digital skills, research integrity, and provide data stewards to support researchers
- Reform the evaluation of academics and research staff to reward conduct and (local) impact, not just publications

Main messages

- The research system and process are changing, and this will accelerate
- Those who master this transition or leapfrog to the new system will see enormous benefits in impact, efficiency, fairness and trust
- To reap the benefits countries and institutions need to modernize:
 - Reform the ways research assessment is done
 - Reform how knowledge is codified, shared and disseminated
 - Provide the corresponding digital skills, infrastructures and services
 - Update their legal and regulatory framework

Need:

- National (open) science plan with objectives, tasks, owners and timetable
- Consequent funding for both R&D and its infrastructure

Thank you



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