



# OpenAIRE input on UNESCO's open science consultation

15 June 2020

## Introduction

The potential of open science is vast and profound and goes far beyond the sharing of the outputs of research. At its core, it promotes the concept of sharing research, building on cumulative results, largely based on the verification of previous results, thanks in the main to the plethora of digital technologies. This ultimately leads to a radical transformation of the culture of research. Open science has the ability to change the ways in which research is performed via its inputs and sources, in its collaborations and partnerships, in how, and how quickly, it is accessed and applied. It can embrace diverse and inclusive modes of communication, dialogue and engagement, in how research is validated and reviewed, and in new, richly-enhanced and deeply-interconnected types of outputs.

The pursuit and application of knowledge in the service of the grand challenges facing humanity is a truly global endeavour. Science can only succeed in this context when it is openly shared and accessible by all. Science 'done right', through open science can transform society by opening up access to knowledge via the free flow of information. This, in turn maximises the societal and economic impact of research for the global benefit of humanity and of the planet.

Open science is therefore a fundamental foundation of the UN Sustainable Development Goals and constitutes a cross-cutting contribution to the achievement of those Goals. **For this reason, OpenAIRE fully supports UNESCO's call to develop global open science principles and endorses UNESCO's efforts to promote and achieve open science.** Below is an overview of what key factors should be included in any global recommendation for open science.

## Principles for Success

In order for open science to succeed, a number of underlying factors have to be realised.

### 1. Make Open Science the Default

There is emerging support for open science at the national level, across institutions and research performing organisations (RPOs), a 'movement' which transforms, replaces or otherwise optimises traditional scholarly communication systems and processes through the implementation of open science practices. However, there is a long way to go before open science becomes the default, mainstreamed, practice within RPOs. To embed open science as an expected, core research practice, existing frameworks which support research need to be further empowered, resourced, re-imagined and re-engineered. This includes integrating open science within common research practices, working in close and meaningful collaboration with many and diverse research communities, along with a concerted effort to connect and seamlessly integrate other resources and research infrastructures within dynamically evolving, ethical and sustainable research processes.

*Recommendation: Encourage the recognition of Open Science practices within mainstream research practices.*

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## **2. Aligning Rewards and Incentives with Open Science**

Research communities who are embracing open research practices increasingly understand that the open sharing and reuse of research presents unprecedented opportunities for achieving new, more meaningful and more relevant forms of research impact. Out-dated and redundant research recognition and career assessment methodologies need to be re-designed and replaced in support of this new research environment. Much remains to be done, however, to convince researchers, policymakers and research funding bodies a) of the necessity for this change, and b) of the capacity and preparedness of current research evaluation systems to reflect and implement this change. The assessment of researchers and of research should recognise and reward new and changing forms of research-sharing reflecting open science. Responsible openness is part of daily life in the research community and it should permeate the entire research process, from the proposal submission and evaluation stage to final / ongoing reporting and communication. The practice of open science should become a known, well-understood and standardised element in researcher recruitment and promotion criteria. Research organisations already have the necessary evaluation practices, incentives and services needed to support the recognition of open science.

Further work is required, particularly in the following areas:

- Indicators and measures recognising data sharing;
- Open research metrics and ‘responsible metrics’;
- Methods of recognising and rewarding the full diversity of outputs (and contributions to inputs/outputs)
- Methods of recording and presenting the broader social, cultural and economic impact of research
- The use of open citations, e.g. the Initiative for Open Citations

The next stage is the practical implementation and embedding of these processes across institutions and reflecting them in appropriate policies.

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*Recommendation: Integrate new methods and criteria of research evaluation recognising open science practice.*

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## **3. Embrace Scholarly Diversity**

All researchers should have an equal opportunity to publish their research through open access, regardless of their field of research, funding stream, or career stage. It is critical to be inclusive and recognise differing needs, approaches and timeframes, paying due attention to researchers’ requirements, regardless of discipline. Furthermore, while innovation in scholarly communication is

vital, the research environment should not be dominated by just a few players but rather be one that fosters diversity in solutions and agencies.

The grand global challenges are likely to be best addressed by inclusive, multi-disciplinary, trans-disciplinary and truly interdisciplinary approaches. To enable this, disciplinary, linguistic, geographic, cultural and demographic diversity must be actively encouraged and supported. Responsible research and ethics incorporate open science and should include the enabling of bibliodiversity, along with support for sustainable research dissemination within differing socio-economic environments and within the global context. The academy and the research community have a natural role in ensuring these standards and should be supported in increasing their responsibility in this area.

While research practices are diverse, there are some cross-cutting values that should be universally recognised, such as:

- Adherence to the principles of open, transparent and equitable access;
- When publication charges are required, they should be paid only to fully OA publications;
- Support for collaborative non-APC publishing models.

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*Recommendation: The scientific community should have a strong stake in the control of the publishing process and ensure diversity in scholarly communications, and community-governed infrastructures.*

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#### **4. Open Science Policies as a Principle**

The open science policy landscape is very heterogeneous in European member states as well as within the broader global context, with quite different levels of policy maturity and implementation. A principle aim should be to have open science policies embedded in all countries - at funder, institution and government level - which ultimately support the roll-out of a sustainable set of open science practices. An internationally-agreed roadmap presenting a series of levels of open science practice attainment could support the development of open science policies and iterative implementation across this diverse landscape. The tenets of these policies should include:

- Support at the institutional, national and funder levels for standards-based, open science research infrastructures, particularly those capable of integrating internally and externally with complementary systems, resources and structures;
- Sharing of research outputs as a basic right, allowing free and immediate access to peer-reviewed literature and supporting access to open science publishing for all researchers regardless of economic circumstances;
- FAIR research data management. There should be a focus on research data and methods that are as open as possible and as closed as necessary and managed according to the FAIR principles. Research methodologies and supporting sources, including research data, should be recognised as research outputs in their own rights;

- The requirement to implement open science rewards and incentives, including the inclusion of the following within institutional/funder assessment and individual researcher evaluation processes (see Point 2, above);
- The embedding of open science skills as a core competency in researcher career training (see Point 6, below), recruitment and career progression.

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*Recommendation: Pave the way for national funders and institutions to establish open science policies with internationally-recognised levels of attainment. Ensure that these policies are implementable and embrace diverse research outputs and alternative reward mechanisms.*

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## 5. An Emphasis on Open Infrastructures

Scholarly infrastructures that serve researchers should be open by default and avoid any proprietary ownership that could put profit before the principles of free access. Other fundamental features of 'open' include open governance of the infrastructure, a participatory system that is built on existing networks and standards and an emphasis on making them interoperable with other systems based on common standards. Each research object should be discoverable via a commonly recognised set of persistent identifiers, which also helps outputs to be monitored, an important feature in measuring use and impact. Community-built and owned resources are a good example of a sustainable approach, for example, the OpenAIRE Research Graph,<sup>1</sup> which is free at the point of use or the OpenAIRE Guidelines,<sup>2</sup> which are community driven by intention and based on an inclusive approach to adopting established standards.

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*Recommendation: Any research supporting infrastructure or service should have a strong community-led base and ensure interoperability and inclusivity.*

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## 6. Systemize Open Science Competences and Skills and Training Provision.

At a minimum, researchers at every career stage should have the capacity and skills necessary to publish in open access, enable FAIR data, and practice open science. Open science skills attainment should be included in research reporting and evaluation (e.g. at national, funder and institutional levels) as presented in the [OSPP Career Assessment Matrix](#). In addition, those supporting researchers – librarians, data stewards, IT specialists, research managers, administrative and support staff, funders, policy-makers, research and academic leaders – need training in open science supporting appropriate levels of competence and expertise. The global culture of open science needs to be underpinned by systematic and recognised open science skills development,

<sup>1</sup> <https://explore.openaire.eu/>

<sup>2</sup> <https://guidelines.openaire.eu/en/latest/>

training and mentorship. Internationally-standardised and accredited skills for open science for researchers at all career levels should be developed and endorsed, including among research students and supervisors. Libraries are well positioned to set up open science competence centres and open science should be recognised as a specialism within the library profession with the inclusion of appropriate training on M.L.I.S. programmes.

In order for open science to be fully mainstreamed within society, training in open science practices should be introduced at the earliest possible educational level, ideally from elementary school onwards (embedding simple data management concepts and an awareness of information literacy, web safety, content ownership and sharing). These should be developed in a working research environment at undergraduate and postgraduate levels and be integrated in the training of Citizen Scientists and of professional practitioners and media professionals.

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*Recommendation: Agree on a standardised set of open science competencies aligned with specific researcher career stages, and develop recognised skills and training programmes in support of the attainment of these competencies. Extend this open science skills provision to a broad range of researchers and research-consumers within the community, including those at every stage of the education system.*

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## **7. Embrace Citizen Science and Open Education Policies and Practices**

Increased engagement of citizens in research and science offers extraordinary potential for achieving beneficial societal change and is likely to be an essential element in addressing grand global challenges such as climate change. Citizen science is part of open science, relying as it does, on open access to research data and publications. In turn, citizen scientists need to be afforded respect and recognition similar to that of other researchers and to be bound by the same standards as other researchers in terms of responsible research, ethics, research dissemination, open access and research data management. If citizen science is to realise its potential, it (and open science practice) needs to be seeded at an early educational stage and supported by a range of impressive open science and citizen science resources and exemplars. Citizen science, in common with the related area of public and patient engagement/involvement (PPE/PPI), should not be an afterthought or a semi-detached add-on to a research project but instead should be properly supported and embedded from the outset, including within research policies, training, resourcing and access to infrastructure.

OpenAIRE currently provides infrastructural and skills/advocacy support for citizen science projects such as the Open Schools' Journal for Open Science<sup>3</sup>, the Schools' Seismic Data Project<sup>4</sup> and Zenodo Citizen Science Integration. This type of support for citizen science should be available in all countries, for all disciplines. Open Education consists of Open Education Practices (OEP) and Open Education Resources (OER) and is a key element of open science. In many ways, citizen science and Open Education represent particularly visible manifestations of the public investment in research, of

<sup>3</sup> <https://ejournals.epublishing.ekt.gr/index.php/openschoolsjournal/index>

<sup>4</sup> <https://portal.opendiscoveryspace.eu/en/community/schools-study-earthquakes-849203>

interest to taxpayers, policy-makers, enterprise etc. However, Open Education is even less evenly developed across countries than open science generally, and requires international collaboration in every area, from Open Education Policies, to standards, to training to supporting infrastructures. Open Education is another important embodiment of open science: it is built upon open science texts and data, it can apply FAIR principles to the management of OER; it can easily integrate with (and should be integrated with) other open sciences policies and it creates its own unique outputs in the form of research-enabled teaching.

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*Recommendation: Citizen science should be an integral part of open science policies and applications at the national, institutional, funder levels and should be promoted and resourced amongst civil society agencies, NGOs, government bodies, educational institutions at all levels and professional associations. Open Education should be promoted and incentivized through fully-integrated open science policies and practice, with OER presented (alongside citizen science projects) as tangible manifestations of science 'done right' i.e. open science in action supporting research-enabled teaching and learning.*

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## Collaborate for Open Science!

The [European Open Science Cloud \(EOSC\)](#) is Europe's answer to tackle the rising field of data driven research in a more efficient way, to break down walls in existing siloed approaches for access to services and all scientific content. Open science should be the modus operandi of this endeavor and as it develops, it will complement Europe's current endeavour to provide its researchers with mechanisms to grant access to a vast wealth of data resources. OpenAIRE plays a pivotal role here with its vibrant European network that supports open science. An Open Science policy framework is one of the 'core' features of EOSC and OpenAIRE can contribute to this core by providing open science policy support in countries embarking on creating open science roadmaps; advocating for open science at a national level and aligning local technical research infrastructures so they seamlessly expose their rich resources via EOSC.

OpenAIRE's Guidelines are a suite of application profiles designed to allow research content and data providers to make the scholarly outputs they have deposited in local repositories visible through the OpenAIRE infrastructure. The profiles are based on community-established metadata and transfer protocol standards and are designed as an inclusive approach to achieving open science that is fully aligned with our principles and recommendations.

While a global and coordinated approach is essential to making open science work, any recommendations should also take into account the importance of regional coordination. Each country and region of the world is different in terms of economics, existing infrastructures, skills and awareness. The approach should be one of alignment with the core principles of open science

<sup>5</sup> <https://guidelines.openaire.eu/en/latest/>



alongside processes and structures supporting bottom-up, institutionally-led implementation, for example in the area of rewards and incentives.

UNESCO's proposed Open Science Partnership would be a welcome approach to lead on the development of a vibrant open science community of practice across the world and to ensure commitment from policy makers, funders and institutions. A number of national open science partnerships are in existence and provide useful examples of the effectiveness of such collaborations.<sup>6</sup>

## About OpenAIRE

OpenAIRE provides an open science infrastructure in Europe, and beyond, which is global, participatory, that collects and makes available all types of research output for the good of society and delivers a set of services and advocacy activities to fully support open scholarship. Europe's research landscape is diverse - and by embracing this positive variety, it has been possible to build a robust infrastructure on existing networks and data sources that brings together research outputs into a succinct central portal to provide free immediate access to research outputs.

OpenAIRE AMKE, founded in 2018 counting over 30 members, has grown out of a series of successful projects, developing its network as a legal vehicle to engage with European member states on committing to setting aside resources for open science coordination and activities, as an integral component of their national research infrastructures.

## Where Now?

Indeed, we believe that much can be learned from the academy-led publishing initiatives and infrastructures of the global south, platforms represented by the Global Alliance of Open Access Scholarly Communication Platforms (GLOALL), for example.

OpenAIRE has a European focus, but recognizes open science as a global endeavor and already collaborates extensively on a worldwide basis. Given appropriate alignment and with the right policies and infrastructure in place, we are confident that open science is a goal that can absolutely be achieved on a global basis. We remain committed to open science as a fundamental approach to doing science 'right' and look forward to contributing to UNESCO's important development within this area.

If ever a stark illustration was needed of the global imperative for open science, we have it now, with a sweeping pandemic that has traversed all boundaries, societal, economic and geographic. The weaknesses and failures of the traditional system of research dissemination have been placed under a searing spotlight, brutally exposing the existing system's issues with access, timeliness, review processes, verification/validation, profit-driven business models and trust in the scientific process itself. It is apt and timely for the scientific community to be joined by investors, entrepreneurs, policy makers and citizens in calling for an urgent move to open science.

<sup>6</sup> See for example: Declaration for OS and Research, Finland <https://avointiede.fi/en/policies/declaration-open-science-and-research-2020-2025> and [OA to scholarly publications – National policy and executive plan by the research community in Finland for 2020–2025: Policy component for OA to journal and conference article](#) Ireland's [National Framework on the Transition to an Open Research Environment](#)

France: a [national plan](#) for the implementation of OS



**It is entirely appropriate for UNESCO to lead the way forward from the current fragmented scientific and policy environment to a global understanding of the meaning, opportunities and challenges of Open Science, and UNESCO has the full support of OpenAIRE in this endeavour.**