# POSITION PAPER ON OPEN SCIENCE

## Purpose of the position paper

This statement has been published with the aim of expressing a common position on Open Science, based on professional consensus, in response to the current paradigm shift in the world of science, which, in line with the recommendations of international science organisations and the relevant policy objectives of the European Union, summarises the principles and the fields of activity of Open Science that best serve the interests and development of Hungarian science. The statement also aims to draw the attention of the scientific community in Hungary towards the importance and timeliness of the new approach, its strategic issues and the increasingly important role of Open Science in international cooperation.

## What is Open Science?

Open Science is a new approach to scientific communication, based on the principles of transparency and collaboration. It is also an innovative way of disseminating the new research outputs using the latest technological developments and digitalisation.
Open Science means, on the one hand, access to the achievements of significant international research and the results of Hungarian science previously or recently published in Hungarian and other languages. On the other hand, Open Science offers a new perspective that allows all actors in the world of science to adopt an open approach, emphasising cooperation in addition to competition, thus strengthening civil society's trust in science.

The key pillars of the Open Science ecosystem are:

- open access to research outputs
- *FAIR(1)* and *CARE(2)* research data management
- research integrity
- next generation metrics in research assessment
- new types of rewards and initiatives
- international cooperation networks
- Citizen Science
- education and skills

*FAIR = Findable, Accessible, Interoperable, Reusable*

*CARE = Collective benefit, Authority to control, Responsibility, Ethics*

## Open access

The aim of *open access* is to provide the research community with a global opportunity for extending the spectrum of research in interdisciplinary or multidisciplinary directions, and to make recent scientific output freely accessible to all stakeholders.

The Signatories support the promotion of *open access* in practice, in order to ensure that the Hungarian research community has immediate and free access to the latest scientific results. At the same time, *open access* contributes to increased visibility of Hungarian scientific work at an international level, and facilitates a paradigm shift in the world of scientific communication.

In order to increase the visibility of Hungarian science, reduce institutional subscription costs and ensure the most efficient and economical use of public funds, the *open access* model provides an opportunity to replace the current, in many respects *unsustainable*, scholarly communication system with a transparent, interoperable, competitive, durable, *fundable* model that follows scientific output, in line with the interests and needs of the scientific community.

Open access publishing requires higher education institutions and research institutes to set up their own financial fund, which is eligible for financial support in the funding programmes operated by research funding organisations and covers the costs of open access publications by authors affiliated with the institutions.

All research-focused institutions should set up equal conditions and opportunities for researchers to make their publications openly accessible.

Open access might be realized in various forms:

- an article can be published by fully open access publishers for a charge (APC - article processing charge) in gold open access journals, where the publication becomes freely available and reusable on the journal's platform immediately after publication;
- through consortium-level transitional agreements in the publisher's traditional subscription journals (hybrid journals);
- repository hosting by authors, where publications become open access after an embargo period
- and in a platinum open access journal that does not require *APC*.

Requirements for open access publication:

- Shifting to *open access* should lead to a reduction in the current subscription fees.
- Whenever possible, articles by Hungarian authors should be made openly available from the moment of publication.
- Articles should be published under the *Creative Commons CC-BY* licence.
- Repository journals and independent, platinum open access journals should have (national or foreign) accreditation.

The Signatories shall support the maintenance and further development of the Electronic Information Services (EISZ) National Programme, which provides access to unabridged texts in scientific journals and at the same time provides the possibility for publishing open access under the national consortium-level transitional agreements for all authors affiliated at a consortium member institution.

Transitional agreements (*transitional, offset, read-and-publish*, etc.) manage subscription fees and open access publication fees under a single contract. The main advantage of this model is that it provides the opportunity of co-management, while the share of APC contributions and open access articles increases, subscription fees will decrease.

Knowledge assets of higher education institutions and research institutes are managed through the implementation of a dedicated ecosystem of research infrastructures worldwide. The visibility, accessibility and long-term preservation of national scientific results can be ensured at both the institutional and national level by operating a nationwide network of institutional repositories and developing a national aggregator service based on them.

It is advised that open access availability and long-term preservation of scientific publications are catered for at the repository of the institution, to which the author of the published work is affiliated. Building on existing national institutional repositories, while preserving their sovereignty, the Signatories support the development of a user-friendly *national repository search platform* that is developed, maintained and operated by the institutions, with the costs covered by the state budget.

In line with the objectives of Open Science, the Signatories shall support the publication in platinum *open access* journals and the operation of domestic platinum *open access* journals.

## Research data management

In line with international trends in scholarly communication and the recommendations of the European Commission, the Signatories support research data management according to the FAIR and CARE principles. Therefore, research data should be

- **findable** - by humans and machines alike, with a unique identifier, provided with metadata and, where possible, their metadata should be stored in a repository;
- **accessible** - accessible to both humans and machines via a defined and open communication protocol, possibly after identification and via secure network, and metadata should be accessible even when the data is no longer accessible;
- **interoperable** - allow data to be interpreted and integrated into workflows, (meta)data should use vocabularies that follow FAIR-principles and include qualified references to other (meta)data;
- **reusable** - allow for future reuse of the data, i.e., the description of the data should contain as much accurate and relevant metadata as possible, be clear and accessible. The licence of use, the origin and history of the (meta)data should be well documented and the (meta) data should comply with the conventions and expectations of the professional community.

Research funding programmes will define the specific evaluation criteria on data management plans. It is also expected that permanent identifiers are used and that the data and the permanent identifier of the published datasets are entered in the Hungarian Science Bibliography (MTMT). The strategic objective is to have national or international accreditation of data repositories.

The Signatories support the establishment, maintenance and continuous improvement of the national research data management infrastructure. The training of professionals is essential for running the system efficiently and successfully, therefore the launch of accredited training programmes for data stewards is a priority.

The Signatories also call for the development of a network of publication and data repositories in line with national FAIR - CARE recommendations, and the allocation of financial resources to further develop the range of services offered by each institutional repository. Furthermore, the Signatories support the development of research data service platforms, which will enable networking between institutional repositories while preserving the sovereignty of institutional publication and data repositories, as well as provide high quality services to the national research community.

## Research integrity

According to the universal principles of science, the fundamental pillars of Open Science are research integrity and scientific autonomy, including diversity and equality, excellence, integrity, the inquisitiveness of researchers, responsibility, ethical behaviour and reflexivity.

The freedom of scientific research is a universal right and a fundamental principle of the European Union, which was unanimously accepted by the Member States by the signing of the Bonn Declaration in October 2020, in line with the declarations ratified by the UN member states, as well as the Hungarian Constitution, domestic legislation and statutory provisions. Freedom of scientific research applies to all research institutions and all scientific disciplines.

The Signatories are strongly committed to protecting research integrity. Research integrity gives the scientific community the freedom to define research questions, choose and develop theories independently, collect empirical data and apply well-established scientific research methods, put forward theories that go against the prevailing scientific views, and introduce new ideas and approaches.

## Next generation metrics in research assessment

The spread of Open Science necessitates a revision of the practice of benchmarking based on quantitative methodologies, by introducing a new, holistic approach that considers the research assessment processes as a fundamental quality assurance condition for the creation of new knowledge and innovation, to support social and economic development. The evaluation should primarily focus on the content of the research.

Methods for evaluating scientific performance should support evaluators in carrying out qualitative assessments that take into account a broad spectrum of research outputs and activities. Research evaluation processes should be clear and transparent at all stages and for all stakeholders. Research institutions should continuously monitor and regularly review the reliability of their own evaluation processes. The updated guidelines should be accessible to all stakeholders.

Research funding organisations should streamline evaluation processes to ensure transparency and reduce the burden on evaluators and applicants. The standardisation and interoperability of the whole application process within organisations and in line with other national and international organisations would be advantageous.

Organisations need to unambiguously define the meaning of any terms they use to describe research performance (e.g., excellence), clearly highlighting where evaluation methods use different, discipline- or career stage-specific criteria to define quality. Comparing assessments for research purposes will help improve the operational efficiency of these processes.

The list of criteria for selecting reviewers needs to be publicished. The work of reviewers should be duly recognised, both in terms of the reviewers' career-assessment and in terms of fair remuneration. The transparency of the assessment process, the publication of the evaluation guidelines and criteria, as well as the assessment forms and the minutes of jury meetings will all increase confidence in the application system, while at the same time provide important lessons for applicants to better understand the evaluation system and improve their future applications, should their application not be approved.

The Signatories recommend that all research assessment organisations publish freely accessible and user-friendly guidelines on all the processes they follow when conducting assessments. The guidelines should include a description of the criteria and methodology used for the assessment. However, research funding organisations and decision-making bodies should consider incorporating a *response-and-feedback* mechanism into their assessment processes to improve the quality of assessments.

## New types of rewards and initiatives

The future performance and competitiveness of a new Hungarian research, development and innovation ecosystem largely depend on the closer cooperation between stakeholders, such as policy-makers, higher education and research institutions, businesses and professional organisations. Endorsing the concept of Open Science throughout the national innovation ecosystems promotes transparency and interoperability, and the sharing of best practices and results can inspire further research and innovation projects.

The Signatories support the inclusion of the concept of Open Science as an important aspect in the frameworks of domestic research funding organisations, supporting both individual research excellence (e.g., OTKA - Hungarian Scientific Research Fund - grants) and research at the institutional level (e.g., thematic programmes). Thus, the dissemination of a new perspective

can be greatly enhanced, and the networks of National Laboratories and Territorial Innovation Platforms can apply this new approach in RDI projects, networking and social communication. The elements of Open Science, which are widely applicable in funding schemes, also support the internationalisation of Hungarian science. The mainstreaming of Open Science-principles in both individual and institutional research schemes in the European Union's Horizon Europe framework programme is a good example of this.

## International cooperation

The European Open Science Cloud (*EOSC*) is an ecosystem for the storage and processing of research data and the development of a common European research infrastructure platform in support of European science. The European Commission set up this initiative with the aim of promoting a more coherent and compatible operation of existing European research data infrastructures and to achieve an alliance of data and related infrastructures, in accordance with FAIR-principles, among others.

Launched in 2015 and supported by the European Commission, the EOSC initiative is a European partnership, planned and funded under *Horizon Europe* as of 2021. Established in July 2020, the EOSC *Association* is a unified and formal organization with a priority to dynamically expand its membership.

The Signatories encourage Hungarian scientific-, research-, development- and innovation organisations and institutions to join EOSC, thus promoting international collaboration and the visibility of Hungarian science. In addition, the Signatories support international co-operation that is capable of improving the position of Hungarian science globally, promoting the completion of researchers' careers, and fostering multidisciplinary and intersectoral research.

## Citizen science

Citizen Science, also known as community science, is an area of Open Science activities where researchers and research communities take the initiative to involve citizens, local communities and the wider society in certain research processes. The participation of citizens in the research ecosystem enables direct, active and participatory learning of scientific work, thus strengthening trust in science, shaping public opinion and increasing the scientific knowledge of citizens.

Citizen Science, or engaging citizens in research, can also play an important role in the mission of higher education institutions. Research projects based on the principles of Citizen Science can support social innovation, help improve well-being and enhance life for the local community. Citizen Science, in line with the European Union's cohesion policy, can contribute to reducing disparities between regions, thus supporting social renewal.

The Signatories consider local and regional Citizen Science projects initiated by researchers as special opportunities to promote science and support the pursuit of such objectives. The success

of Citizen Science projects requires a stable and predictable funding base over the long term, as well as a widespread, open access mode of dissemination of research results.

## Education and Skills

The transformation of scholarly communication requires further research, the redesign of training, and adaptation to changes, challenges, opportunities and risks in the digital age of the 21st century. Building the Hungarian Open Science ecosystem requires thoughtful investments in creating capacities with a focus on human resources, training, education and the improvement of digital skills for new technologies. The systematic and continuous improvement of skills and capacity-building activities is recommended to cover further research on the questions, values and implementation of Open Science in the fields of digital literacy, digital collaboration and FAIR data management.

The development of skills and capacity-building should cover a wide range of technical skills, archiving, long-term preservation and accessibility of publications and data, information and data literacy, secure networking, protection of the intellectual property and content sharing, software development and the provision of the necessary IT back-end systems. The Signatories strive to achieve a broad professional consensus within the frames of Open Science-competences, which is to be adapted to each discipline and take the different stages of the researcher's career into consideration.

The Signatories encourage the use of open education sources and the involvement of the necessary human resources in order to increase access to education and research resources, improve the achievements of learning, and maximise the use of public funding.

The efficient operation of Open Science also requires professionals who, in collaboration with the scientific community, manage and maintain e-resources, repositories for publications and research data, as well as software, according to the agreed principles. To take advantage of the opportunities offered by Open Science, the research community, higher education and research institutions and Citizen Science initiatives require complex digital skills and broad competences, including for example analytics, statistics, machine learning, artificial intelligence, visualisation, and the responsible use of code writing and algorithms.

Actors in the market sector and civil society need specific competences to understand Open Science. The skills required to communicate with society should be considered essential components of the researcher's competence, hence the Signatories recommend the integration of these communication skills in the higher education curricula. A position paper on Open Science can be a key contribution to the strategic documentation of higher education institutions. The Signatories propose an incentive to practice the concept of Open Science, and to strengthen cooperation between all actors in the scientific community, with particular attention to organisations and associations of early career researchers and the community of young researchers.

## Call

**According to the recommendations of the European Commission (EC), the European Open Science Cloud (EOSC), Science Europe and the European University Association (EUA), UNESCO and International Science Council (ISC), and in line with the initiatives set out in the Commission's Communication on the European Research Area and the relevant principles of the *Horizon Europe* Framework Programme, the Signatories of this declaration support the promotion of Open Science practices and call on all stakeholders in the scientific community to join and sign up to this resolution.**

Budapest, October 2021

### Initiated by the

National Research, Development and Innovation Office (NRDI Office)

### Supporting Organisations

Association of Hungarian PhD and DLA Candidates
Association of University Libraries' Directors
Eötvös Loránd Research Network
Ministry of Innovation and Technology
Governmental Agency for IT Development
Hungarian Accreditation Committee
Hungarian Rectors' Conference
Hungarian Academy of Sciences
Hungarian Doctoral Council
National Scientific Student's Council