Leibniz Open Science Policy

Adopted by the General Assembly of the Leibniz Association
on 24 November 2022.

Preamble

The global science system is undergoing a fundamental transformation, in which openness and the opening up of research have become increasingly important principles. As a result of this development, science conditions and requirements are shifting towards more open practices. Open Science for and with society is becoming a central strategic area of activity.

As used within this policy, the term 'Open Science' includes measures to promote transparency, accessibility, reproducibility and usability of scientific results and scientific practices in a number of different dimensions. The policy invites the Leibniz institutes to engage with Open Science, to avail themselves of the wide range of dimensions, taking into account subject- and institute-specific needs and requirements, and to develop their own Open Science strategies.

The Open Science Policy was drawn up in the knowledge that global events can both strengthen Open Science and reveal limits. However, the principles underlying Open Science are not changed as a result of such events.

In its Open Science Policy as elsewhere, the Leibniz Association is committed to the aims of scientific excellence and social relevance, in line with the Guiding Principles for our Actions in the Leibniz Association.[1] The fundamental principles and practices of increasingly open science address both science itself and its environment.

Links between the policy and other voluntary commitments and strategy papers of the Leibniz Association

These links can be divided into three types:

1. Superordinate: These include the Guiding Principles for our Actions in the Leibniz Association[1] and the Guidelines for Good Scientific Practice in the Leibniz Association.[2] The Open Science Policy follows these fundamental documents, but fleshes them out in terms of the requirements for science to become increasingly open.

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[1] Guiding Principles for our Actions in the Leibniz Association (2019): www.leibniz-gemeinschaft.de/fileadmin/user_upload/Bilder_und_Downloads/%C3%9Cber_uns/Integrit%C3%A4t/Guiding_Principles_for_our_Actions.pdf

[2] Guidelines for Good Scientific Practice in the Leibniz Association (2019): www.leibniz-gemeinschaft.de/fileadmin/user_upload/Bilder_und_Downloads/%C3%9Cber_uns/Integrit%C3%A4t/Guidelines_for_Good_Scientific_Practice_in_the_Leibniz_Association.pdf

2. Coordinate: These include the Sustainability Mission Statement of the Leibniz Association,[3] the Leibniz Transfer Policy[4] and the Career Guidelines of the Leibniz Association.[5] These documents overlap thematically with the Open Science Policy. Open practices can help achieve the goals mentioned there.
3. Subordinate: These include the Open Access Policy of the Leibniz Association[6] and the Guidelines on the Handling of Research Data.[7] The Open Science Policy does not replace these, but places them in a wider context that makes space for future documents.

1. Terminology

The progressive digital transformation of science, including the provision and use of relevant infrastructure, has already led to a fundamental cultural and structural shift in science. This change brings new opportunities for communication and collaboration in research and teaching, and creates new approaches to participation by members of society. Open Science is a key factor in this development.

Open Science – understood as the opening up of research, research methods and infrastructure and results – is an integral part of implementing and securing good scientific practice in exchange with the scientific community and between science and the non-academic environment.

Open practices promote transparency, accessibility, reproducibility and re-usability of scientific results and practices. Among other things, they serve the following goals:

- Increase trust in research results,
- Put in place conditions necessary to check the quality of research,
- Accelerate scientific progress and innovation,
- Increase efficiency and optimise resource utilisation,
- Reduce inequalities, including in terms of access to science, and
- Make the results of publicly funded research publicly accessible.

But there are also limits to openness and providing access, e.g. commercial, legal or ethical and moral reasons, so that the general principle must be “as open as possible, as closed as

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[3] Sustainability Mission Statement of the Leibniz Association (2019): www.leibniz-gemeinschaft.de/fileadmin/user_upload/Bilder_und_Downloads/Über_uns/Nachhaltigkeit/Sustainability_Mission_Statement.pdf

[4] Leibniz Transfer Policy (2018): www.leibniz-gemeinschaft.de/fileadmin/user_upload/Bilder_und_Downloads/Neues/Mediathek/Publikationen/Brosch%C3%BCren/Transfer_broschuere_EN.pdf

[5] Leibniz Guidelines on Career Development (2020) incl. the addendum on Structuring the Doctoral Phase (2021) and the addendum on Career Models in Research Infrastructures (2021): www.leibniz-gemeinschaft.de/en/about-us/whats-new/media-centre/publications/career-guidelines-of-the-leibniz-association

[6] Open Access Policy of the Leibniz Association (2016): www.leibniz-gemeinschaft.de/open-access-policy

[7] Guidelines on the Handling of Research Data within the Leibniz Association (2018): www.leibniz-gemeinschaft.de/fileadmin/user_upload/Bilder_und_Downloads/Forschung/Open_Science/Leitlinie_Forschungsdaten_2018_EN.pdf

necessary".[8] For instance, the dual-use problem concerning the potential misuse of scientific findings,[9, 10] calls for a careful assessment in the context of Open Science. In addition, there may be commercial or legal logics of utilisation or data protection rules that prevent or restrict free access.

2. Selected dimensions of Open Science

The following dimensions of Open Science can be seen as potential entry points for the Open Science policies of Leibniz institutes. The dimensions may differ in terms of their relevance and binding force for the institutions, depending on existing policy papers and subject-specific differences. The policies may address either a single dimension (e.g. in the form of an Open Access policy), or several dimensions in the interests of a more comprehensive treatment of the topic of Open Science.

Some of the dimensions are closely interconnected, so a strict separation of terms is not always possible. All dimensions contribute to the above-mentioned Open Science goals.

Open Access

'Open Access', as used within this policy, is a superordinate principle for unrestricted, cost-free access to scientific data, metadata and information of all kinds for all people everywhere. As well as access, it is about granting additional rights (e.g. dissemination and processing options), for instance through the use of suitable licences. Among other things, this speeds up scientific publication processes and increases the visibility and impact of research. The Leibniz Association has already created a suitable open access framework, through its Open Access Policy,[11] which was adopted in 2016.

Open and FAIR Data

'Open Data', as used within this policy, are data and metadata that are accessible and can be freely used, shared and reused. The FAIR principles[12] represent an important further development of the Open Data concept. FAIR data are data that are findable, accessible, interoperable and reusable. Open and FAIR data increase the potential for new research questions and new knowledge gains. The Leibniz Association has already created a suitable

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[8] European Commission. Directorate-General for Research & Innovation. H2020 Programme. Guidelines on FAIR Data Management in Horizon 2020. Version 3.0 (2016): https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-data-mgt_en.pdf

[9] Leibniz Association guide on "Risk management in international scientific cooperation – points to consider" (2021): www.leibniz-gemeinschaft.de/fileadmin/user_upload/Bilder_und_Downloads/%C3%9Cber_uns/Internationales/Risk_management_in_international_scientific_cooperation.pdf

[10] Handling Security-Relevant Research: https://www.dfg.de/en/research_funding/principles_dfg_funding/security_relevant_research/index.html

[11] Open Access Policy of the Leibniz Association (2016): www.leibniz-gemeinschaft.de/open-access-policy

[12] FAIR principles: https://www.go-fair.org/fair-principles

framework for the implementation of this dimension of Open Science as well, through its Guidelines on the Handling of Research Data,[13] which were adopted in 2018.

Open Research Software

'Open Research Software', as used within this policy, is research output (publications), in the form of scientific software and its documentation, that is publicly accessible and referenceable. It makes the development of research software more visible and useable, both as a research output and as a contribution to support for research, and gives greater consideration to its importance. As a rule, software is made available as open source software with appropriate licencing.

Open Infrastructure

'Open Infrastructure', as used within this policy, is infrastructure that enables open access to, or the sharing of, digital objects, and is based on open source software and open standards (interfaces, protocols, formats). It includes e.g. repositories that support legally compliant storage and publication, including the publication of data and research software. Certain open infrastructures can be used as a basis on which to build subject-specific and application-specific services.

Open Research Methodology

'Open Research Methodology', as used within this policy, is the transparent, freely accessible documentation of the research process (e.g. through pre-registration, laboratory protocols) and the publication, or at least referencing, of all hardware and software used (e.g. equipment, operating and research software and analysis code).

Open Educational Resources

In line with the UNESCO definition,[14] 'Open Educational Resources', as used within this policy, are educational materials in any format that have been released under an open licence and are freely available for widespread use.

All the dimensions listed here optimise knowledge transfer, as defined by the relevant Leibniz policy,[15] and community-engaged research (e.g. the Leibniz Association's citizen science activities[16]).

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[13] Guidelines on the Handling of Research Data within the Leibniz Association (2018): www.leibniz-gemeinschaft.de/fileadmin/user_upload/Bilder_und_Downloads/Forschung/Open_Science/Leitlinie_Forschungsdaten_2018_EN.pdf

[14] Open Educational Resources: https://www.unesco.org/en/open-solutions/open-educational-resources

[15] Leibniz Transfer Policy (2018): www.leibniz-gemeinschaft.de/fileadmin/user_upload/Bilder_und_Downloads/Neues/Mediathek/Publikationen/Brosch%C3%BCren/Transferbroschuere_EN.pdf

[16] Citizen science: www.leibniz-gemeinschaft.de/en/research/citizen-science#:~:text=The%20Citizen%20Science%20Experiment%2C%20conducted,order%20to%20conserve%20agro%2Dbiodiversity.

3. Areas of activity for the promotion of Open Science

The areas described below offer entry points for the promotion of Open Science and present a framework, within which the Leibniz Association as a whole and the individual Leibniz institutes can position themselves, taking into account subject- and institution-specific characteristics.

Strategically embedding open practices

The growing relevance of Open Science increases the importance of a strategic engagement with, and embedding of, open practices in day-to-day research. Open Science can be addressed at Leibniz Association and institute level e.g.

(a) in the context of an existing overall strategy,

(b) within overarching Open Science guidelines, or

(c) by focussing on one or more specific Open Science dimensions.

Promoting a culture of openness and creating incentive structures

Two aspects are of key importance for promoting Open Science practices: (1) a culture of openness and (2) the creation of appropriate incentive structures.

In terms of a culture of openness, a review of how openness is practised at the institute in question and what this means for employees' own actions can be used as a starting point. Specifically, promoting a culture of openness can, for instance, focus on open access to results and findings, or on open collaboration. For this, a suitable framework can be set up at institute level to establish basic principles and (methodological) standards for openness both at institute level and in individual areas of work. Furthermore, Leibniz institutes can promote a culture of openness by proactively advocating for Open Science with stakeholders outside of the Leibniz Association, such as project partners, funding authorities, politicians, etc.

To create incentive structures, it is vital to change the evaluation system for research, taking into account the entire value creation process of research, with its different kinds and levels of contribution. An important component of this comprehensive change is providing support for, and recognition of, different roles and career paths in the science system. Career development measures, including promoting diverse career paths, are already at the heart of the Leibniz Guidelines on Career Development,[17] the addendum on structuring the doctoral phase[18] and – particularly important in relation to Open Science – the addendum on career models in research infrastructures.[19]

At Leibniz Association level, it is necessary to establish framework conditions that create acceptance for openness. Developing methods and criteria to promote Open Science, part of the fundamental responsibility of research organisations, should take into account and support the different research cultures. This includes taking account of diversity, regularly checking the

[17] Leibniz Guidelines on Career Development (2020): www.leibniz-gemeinschaft.de/leitlinie-karriereentwicklung

[18] Structuring the Doctoral Phase (2020): www.leibniz-gemeinschaft.de/ausgestaltung-promotionsphase

[19] Career Models in Research Infrastructures (2021): www.leibniz-gemeinschaft.de/karrieremodelle-forschungsinfrastrukturen

appropriateness and credibility of evaluation procedures and (pro)actively addressing the issue of incentive systems that go beyond the 'classic' indicators, including at political level.

Education and training activities

The Leibniz institutes can support (early-career) researchers at an early stage, helping them to acquire technical skills and digital competence by providing institute-specific support or information about alternative sources of Open Science practices and tools. In this context, at Leibniz Association level, cross-institute education and training activities on individual Open Science dimensions can be seen as a potential area of activity (e.g. pooling skills and relevant courses). The general aim should be to create an enabling structure that is aligned with the institutes' own provisions in an efficient, complementary and needs-based manner.

Contribution to infrastructures

In the context of Open Science, technical and social infrastructures that are available on a sustainable basis take on great importance. Establishing and running them, (re)using them and financing them fall within the remit of the individual institutes or groups of institutes. The aim here is to ensure maximum focus on disciplines, needs and use, and on sustainability as defined by the Sustainability Mission Statement of the Leibniz Association.[20] At the same time, the policy recommends using existing infrastructures to meet individual needs, including infrastructures that operate beyond the Leibniz Association – through collaboration based on a division of labour – or to secure their consulting and interface functions. Thanks to the wealth of infrastructure in its institutes, the Leibniz Association already offers comprehensive infrastructure services to the German scientific community and in the wider international context – especially in terms of information infrastructures, which are important for Open Science. Wherever possible, institutes should use open or science-related, publicly financed infrastructures. This can be supported centrally at Leibniz Association level by initiating or coordinating the various activities.

Science policy engagement and networking

Open Science involves a far-reaching transformation of the way that science is conducted, evaluated and communicated. Active involvement in national, European and international science policy bodies is one of the key ways of playing a part in the discourse around structuring Open Science offerings, laws and processes.

Representatives of the individual Leibniz institutes contribute their subject- and infrastructure-specific expertise in a targeted manner through their involvement in relevant bodies. The decision to get involved in this way rests with the institute in question and also depends on its defined mission.

In the context of science policy networking, there is also a need to exchange recommendations for the practical implementation and communication of best practices. In line with its self-concept, Leibniz Headquarters carries out activities that support the Leibniz Association's capacity to act, its strategy skills, dynamic development and the quality assurance of its processes, its internal and external networking and its communication with funding authorities,

[20] Sustainability Mission Statement of the Leibniz Association (2019): www.leibniz-gemeinschaft.de/fileadmin/user_upload/Bilder_und_Downloads/%C3%9Cber_uns/Nachhaltigkeit/Sustainability_Mission_Statement.pdf

policymakers and society. It responds quickly to ideas from within the Leibniz Association and its environment and, in turn, feeds back ideas into the Association.

The ongoing developments in relation to the Open Science dimensions and areas of activity mentioned here continue to be monitored.[21] The Leibniz Association commits to assessing the impact of this policy in the Leibniz Association at the appropriate time and to modifying it if required.

[21] Examples: the global initiatives GORC – Global Open Research Commons and Global Open Science Cloud, and also the recently formulated CARE Principles