

HELMHOLTZ

Open Science

Helmholtz Open Science Policy

Version 1.0

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Please note: Unofficial translation: This English version is not binding and for convenience only. The German version is authoritative.

Helmholtz Open Science Policy

The present Helmholtz Open Science Policy is organized into three sections. In the section “A. Strategic Positioning,” the Helmholtz Association formulates a commitment to open science in accordance with the principle “as open as possible and as closed as necessary.” In the section “B. Monitoring,” Helmholtz makes a commitment to open science on the basis of the three current focus areas (open access, open research data, and open research software) through specific and verifiable objectives. In the section “C. Implementation and Common Requirements,” in line with the funding policy of the European Commission, open science practices are formulated for implementation purposes.

A. Strategic Positioning

In line with the UNESCO Recommendation on Open Science¹ and the enshrining of open science in national, European, and international science policy, Helmholtz commits itself to open science.

Science lives on the open exchange of knowledge. Sharing, networking, and collaborating are central elements of the culture of scientific endeavor. Digitalization dynamically advances the possibilities of this culture. The paradigm of openness thus opens up new prospects in the entire scientific research cycle and enables research results to be made openly accessible and broadly reusable in sustainable infrastructures. This open culture of scientific endeavor is captured by the term “open science,” and is a guiding principle for Helmholtz in keeping with good scientific practice.

In their drive to make the results of their own work publicly available to science, industry, and society for reuse with as few barriers as possible, the Helmholtz Centers call on their employees to make research results achieved alone or in collaboration with other researchers in the course of their work for Helmholtz open and reusable whenever possible according to the principle of intelligent openness – that is, “as open as possible and as closed as necessary.”²

The further development of open science at Helmholtz will be guided by the following principles:

- **Openness:** Results should be published open access. To ensure the accessibility and reusability of results, the provision of open access³ by applying a Creative Commons CC BY license should be the standard publishing practice for scientific results.
- **Transparency:** Results should be communicated transparently. Research data and research software that are necessary to assess results should be published openly, so that the

¹ UNESCO. (2021). UNESCO Recommendation on Open Science. Available online at: <https://unesdoc.unesco.org/ark:/48223/pf0000379949>

² There is currently consensus that open science and transfer, as two key lines of action at Helmholtz, complement each other well in many respects. At the same time, however, there is great need for discussion on how these crosslinks can be made more fruitful for Helmholtz.

³ Within the meaning of the Budapest Declaration (<https://www.budapestopenaccessinitiative.org/>) and the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (<https://os.helmholtz.de/en/open-science-in-helmholtz/berlin-declaration/>).

results can be transparently classified by third parties (e.g., in the context of reproducibility) at any time.

- **Quality assurance:** Digital research services and open knowledge infrastructures support quality assurance. The quality of results should be assured at every stage in the research process in keeping with the principles of good scientific practice.
- **Cross-linking:** The processing of knowledge objects and resources should be guided by the FAIR Principles. Thus, results should be tagged with standards such as metadata and persistent identifiers, so that findability, accessibility, interoperability, and reuse are permanently guaranteed.
- **Sustainability:** Results should be published in long-term secured and trustworthy knowledge infrastructures (e.g., scholarly publication platforms, journals, and repositories). Evidence-based knowledge for which there is a relevant demand among different societal stakeholders should be prepared in a target-group-appropriate way and made available, for example, through specific information or advisory services for citizens or policy-makers. Furthermore, a broad portfolio of discipline-specific research services (e.g., biomedical technologies, monitoring networks, and continuous simulations) with long-term operating concepts should be operated that enable open access to digital information objects such as research data in a machine-readable way.

In order to organize open science according to the above-mentioned principles, Helmholtz will:

- support researchers in implementing it by providing infrastructures, services, consultancy, and training;
- develop and expand central open science infrastructures, such as publication platforms, in-house publishers, repositories, and consultancy services, and will promote the networking of these infrastructures at international level;
- ensure the funding of these digital information infrastructures for science;
- bear the costs of publishing services provided by publishers and other service providers on condition that their pricing and cost structures are reasonable and transparent;
- promote innovative quality assurance procedures such as open peer review;
- incorporate open science practices into its funding and notification procedures;
- in the context of research assessment, recognize and value the application of open science practices and, to this end, create incentives for open science practices (open access, open research data, open research software, as well as infrastructures and services);
- support networking with other actors to promote open science at national and international level.

Helmholtz supports and promotes open science by maintaining the Helmholtz Open Science Office as a service provider of the Association.

On the Way to Openness by Design

At Helmholtz, the transition “from closed to open” is being supported and promoted by means of concrete activities, services, and offerings. Infrastructures thus also play a key role in this transition. These infrastructures should be seen as dynamically developing sociotechnical structures.

Other areas of activity to be taken into account in this connection are, for example, open educational resources, open hardware, and open services. With a view to digitalization in the sciences, the individual components together form a digital research ecosystem. In this respect, “openness by design” should be a fundamental maxim that guides future developments.

The present Helmholtz Open Science Policy constitutes a further step toward greater openness of science; it will enable the Association to shape the future of science in an active and sustainable way.

B. Monitoring

Helmholtz will continually survey progress in promoting open science, thereby documenting it in a verifiable way.

An annual Open Science Report to the Assembly of Members will report in an aggregated way on the status of open-science-related activities. The compilation will be carried out by the Helmholtz Open Science Office.

The current focus of monitoring is on text publications, research data, and research software. Helmholtz aims at a later stage to expand the focus of monitoring by including further objectives and priorities to promote open science.

Open Access

The target set in 2016 that by the December 31, 2020 deadline, at least 60% of the publications of the previous year that are covered by that policy would be available in open access was reached.⁴ The metric for this is the number of entries with full texts in the repositories of the Helmholtz Centers or other appropriate repositories relative to the overall number of entries in the repositories/publication databases of the Helmholtz Centers for the publication year in question. The target rate for every subsequent publication year increases by a further 10%. From the publication year 2025 onwards, the aim is to achieve an open access rate of 100%.

The integration of this indicator in program-oriented funding (PoF) will be continued in PoF IV.

The Open Science Working Group and the Library and Information Management Working Group will have the task of further developing, if required, the recommendations for the operation of repositories as well as the “Criteria for the Operation of Open Access Publication Funds and the Payment of Open Access Publication Fees.”⁵ The objective is to strengthen scholarly publication organs.

⁴ Note: For the publication year 2019, an open access rate of 67% of publications was achieved by the Helmholtz Association.

⁵ The most recent version of the policy is published on the Helmholtz Open Science Office website. See: <https://os.helmholtz.de/en/open-access/open-access-gold/criteria-oa/>

Open Research Data

All Centers will establish detailed procedures for managing research data in publicly available policies,⁶ and will regularly examine and if necessary adapt these procedures.

In 2023, a basic indicator for the presentation of citable research data publications will be established as an incentive within the framework of the PoF.

By 2024, a Helmholtz quality indicator for research data publications will be developed and established, which will be deployed within the framework of the PoF and will replace the aforementioned basic indicator.

Open Research Software

All Centers will aim to establish detailed research software management procedures in publicly available policies by 2025.⁷

A basic indicator for the presentation of citable research software publications will be established in 2023 as an incentive within the framework of the PoF together with research data publications.

By 2024, a Helmholtz quality indicator for research software publications will be developed and established, which will be deployed within the framework of the PoF and will replace the aforementioned basic indicator.

C. Implementation and Common Requirements

Helmholtz hereby establishes the following basic requirements for open access, open research data, and open research software as framework conditions for the Association as a whole. The further implementation of these requirements shall be integrated into internal Center policies⁸ and, where appropriate, specified.

⁶ See the Recommendations for Policies of the Helmholtz Centers on Research Data Management, 109th Assembly of Members of the Helmholtz Association 2017: <https://doi.org/10.48440/os.helmholtz.026>. A list of the policies can be found at: <https://os.helmholtz.de/en/open-research-data/research-data-policies/>

⁷ In March 2017, the Helmholtz Association's Open Science Working Group adopted a position paper on this topic, and in November 2017, it published a first version of Recommendations for the Implementation of Guidelines and Policies on Research Software Management at the Helmholtz Centers (<https://doi.org/10.48440/os.helmholtz.040>). After further discussion of these recommendations at the Helmholtz Association, a Model Policy on Sustainable Research Software was developed at the Centers and adopted by the Open Science Working Group in November 2019 together with the revised recommendations (<https://doi.org/10.48440/os.helmholtz.041>). A Checklist to Support the Helmholtz Centers in Implementing Policies for Sustainable Research Software was published in 2021 as an aid for the Centers (<https://doi.org/10.48440/os.helmholtz.038>).

⁸ For example, publication policies and research data policies. See also "Die Ressource Information besser nutzbar machen! Positionspapier zum Umgang mit Forschungsdaten in der Helmholtz-Gemeinschaft [Improve the Usability of Information as a Resource! Position Paper on Research Data Management at the Helmholtz Association]" (<https://doi.org/10.48440/os.helmholtz.026>) and Recommendations for Policies of the Helmholtz Centers on Research Data Management (<https://doi.org/10.48440/os.helmholtz.036>).

1 Open Access

1.1 The employees shall ensure that

- at the time of publication, at the latest, a machine-readable electronic copy of the published version or the final peer-reviewed manuscript accepted for publication is deposited in the Helmholtz Center's repository for scientific publications.
- the deposited publication is preferably made freely accessible via the repository immediately, namely, under the latest available version of the Creative Commons Attribution International Public License (CC BY) (in the case of monographs and other long-text formats, an alternative license may be chosen),
- but at the latest 12 months after publication, in accordance with the right of self-archiving (Section 38(4) of the German Act on Copyright and Related Rights [UrhG]).
- they make available via the repository information on research results as well as tools and auxiliary resources that are necessary to validate the conclusions of the scientific publication.

For implementation purposes, employees are encouraged to reserve sufficient rights of reuse to fulfil the open access requirements.

1.2 For implementation purposes, the Centers and their information infrastructure facilities shall ensure that

- the metadata of the deposited publications are accessible under a Creative Commons Public Domain Dedication (CC0) license or another equivalent license; that they are in line with the FAIR Principles (i.e., in particular, that they are machine-readable); and that they include at least the following information: publication (author(s), title, date of publication, publication organ); name, acronym, and number of the funding project; licensing conditions; persistent identifiers for the publication and, if possible, their organizations and the funding. If applicable, the metadata must be supplemented with persistent identifiers for all research results or other tools and auxiliary resources that are necessary to validate the conclusions of the scientific publication.
- the information included in the metadata is identified by means of suitable persistent identifiers (e.g., DOI, ORCID iD, ROR ID, etc.).
- the publication fees incurred for scientific publications that have undergone peer review and are genuinely open access are funded within the framework of in-house regulations. Further information on the payment of costs can be found in the "Criteria for the Operation of Open Access Publication Funds and the Payment of Open Access Publication Fees"⁹ and in the respective internal policies of the Helmholtz Centers.

⁹ The most recent version is published on the Helmholtz Open Science Office website. See: <https://os.helmholtz.de/en/open-access/open-access-gold/criteria-oa/>

2 Open Research Data

The Recommendations for Policies of the Helmholtz Centers on Research Data Management,¹⁰ as well as the German Research Foundation (DFG) code of conduct “Guidelines for Safeguarding Good Scientific Practice”¹¹ and the corresponding framework guideline for the Helmholtz Association will continue to serve as a guide.

2.1 In addition, the employees shall ensure that the following aspects are adhered to:

- The digital research data that they generate shall be managed responsibly and in accordance with the FAIR Principles.¹²
- Especially in the case of EU-funded research projects, the employees shall use the data management plan (DMP) tool, and, in doing so, take into account:
 - its regular updating;
 - the deposit of research data as early as possible and within the time limits specified in the DMP in a trustworthy repository that is indexed in re3data¹³;
 - the provision of open access to the deposited data as early as possible and within the time limits specified in the DMP under the latest available version of the Creative Commons Attribution International Public License (CC BY) or the Creative Commons Public Domain Dedication License (CC0), or a license that grants equivalent rights;
 - the principle “as open as possible, as closed as necessary,” unless the provision of open access would, in particular:
 - prejudice the legitimate interests of the funding recipients, also with regard to commercial exploitation, or
 - be contrary to other constraints.
 - Note: If free access (to some or all of the data) is not granted, this must be justified in the DMP.
 - the provision via the repository of information about research results or other tools and auxiliary resources that are necessary for reusing and/or validating the data.

2.2 For implementation purposes, the Centers and their information infrastructure facilities shall ensure that

- the metadata of the deposited data are published under a Creative Commons Public Domain Dedication License (CC0) or an equivalent license (insofar as legitimate interests or constraints are respected) and in accordance with the FAIR Principles (especially machine-

¹⁰ Recommendations for Policies of the Helmholtz Centers on Research Data Management.

<https://doi.org/10.48440/os.helmholtz.036>

¹¹ German Research Foundation (DFG). (2019). Guidelines for Safeguarding Good Scientific Practice. Code of Conduct. <https://doi.org/10.5281/zenodo.6472827>

¹² Wilkinson et al. (2016). The FAIR Guiding Principles for Scientific Data Management and Stewardship. *Scientific Data*, 3(1), 160018. <https://doi.org/10.1038/sdata.2016.18>

¹³ <https://www.re3data.org/>

readability), and that they include at least information about the following: data set (description, date of deposit, authors, publication organ, and embargo); name, acronym, and number of the funding project; licensing conditions; persistent identifiers for the data set and, if possible, organizations and funding. If applicable, the metadata must also include persistent identifiers for related publications and other research results.

3 Open Research Software

The Model Policy on Sustainable Software at the Helmholtz Centers ¹⁴ will continue to serve as a guide.

3.1 The employees shall ensure that

- wherever possible, the program code that is necessary for reusing and/or validating the published data is made openly accessible in a repository.

3.2 For implementation purposes, the Centers and their information infrastructure facilities shall ensure that

- researchers are supported in publishing research software;
- the metadata of the deposited software/the deposited code are published under a Creative Commons Public Domain Dedication License (CC0) or an equivalent license (insofar as legitimate interests or constraints are respected) and in accordance with the FAIR Principles (especially machine-readability), and that they include at least information about the following: program code (description, date of deposit, version, authors, repository); name, acronym, and number of the funding project; licensing conditions; persistent identifiers and, if possible, organizations and funding. If applicable, the metadata must also include persistent identifiers for related publications and other research results.

Final Provision

This Open Science Policy supplements and replaces the Open Access Policy of 2016.

The individual Centers are responsible for specifying in more detail and implementing the objectives formulated here.

¹⁴ Model Policy on Sustainable Software at the Helmholtz Centers. <https://doi.org/10.48440/os.helmholtz.041>

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