Proposed Revised Data and Article Sharing Policy
Belmont Forum

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The Belmont Forum Open Data and Article Sharing Policies and Principles

Motivation

The Belmont Forum is a partnership of funding organizations, international science councils, and regional consortia committed to the advancement of transdisciplinary science in the global environmental change space. Forum operations are guided by the Belmont Challenge, a vision document that encourages, “International transdisciplinary research providing knowledge for understanding, mitigating and adapting to global environmental change.”

Consistent with the G20 Research and Innovation Ministerial Meeting Manaus Declaration, the Belmont Forum recognizes the role of open science in achieving sustainable development; fostering research and innovation; and promoting diversity, equity, inclusion, and accessibility. Recognizing the crucial role of open and effective data and information exchange to this mission, the Belmont Forum adopts an Open Data and Article Sharing Policies and Principles, which it considers essential to making informed decisions in the face of rapid changes affecting the earth’s environment. This policy of openness will facilitate innovation and the use of scientific collaborations among nations to address common problems and to build the constructive international partnerships that are essential for developing more sustainable societies

The Belmont Forum adopts this data policy and the following principles to widen access to data and promote its long-term preservation in global change research; help improve data management, reanalysis, and reuse; coordinate and integrate disparate organizational and technical elements; fill critical global e-infrastructure gaps; share best practices; and foster new data literacy. “This policy of openness paves the way for science and funding agencies collaborating internationally to reinforce the excellence and integrity of science,” said Kurt Vandenberghe, then co-chair of the Belmont Forum. “It will facilitate innovation through taking

advantage of research data and results and, most of all, it will enhance global scientific collaboration and science diplomacy as essential conditions for developing more sustainable societies." The policy signals a commitment by funders of global environmental change research to increase access to scientific data, a step widely recognized as essential to making informed decisions in the face of rapid changes affecting the Earth's environment.

Overarching policies and principles

The Policy and Principles herein closely follow the data principles promoted in the Belmont Forum e-Infrastructures & Data Management Community Strategy and Implementation Plan (CSIP) previously developed at its 2015 annual meeting of Principals in Oslo, Norway. In addition, Belmont encourages grantees and funders to look to the FAIR Principles and the CARE Principles for guidance on best practices for data sharing. FAIR describes how to make data **F**indable, **A**ccessible, **I**nteroperable, and **R**eusable, while CARE emphasizes **C**ollective Benefit, **A**uthority to Control, **R**esponsibility, and **E**thics, with a special focus on indigenous data.

With the above guidance in mind, this policy specifies that research data must be:

- **Findable** through catalogues and search engines. Data should be accompanied by proper contextual information in the form of rich metadata, and be assigned an appropriate persistent, unique and resolvable identifier (e.g. DOI). Both data and metadata should be machine readable to aid in discovery.
- **Accessible** by default, and made available through sustainable, trustworthy repositories with minimum time delay, except where international and national policies or legislation preclude the sharing of data as Open Data (e.g. GDPR, HIPAA, or other similar privacy restrictions). Data access and use conditions should be clearly indicated by a license.
- **Interoperable**, with clear documentation that uses broadly accessible language and vocabularies that are understandable across disciplines. Preference should be given to non-proprietary data and metadata file formats, as well as international and community standards via data e-infrastructures that facilitate access, use, and interpretation of data.
- **Reusable** by other researchers, including those outside the discipline of origin. Data should be described in the metadata with sufficient detail, including provenance, structure, and other necessary information according to domain-specific community standards. The license and terms, including for reuse, should be clearly indicated.

In addition, Belmont recommends that grantees carrying out community-engaged research – and especially those working with Indigenous communities – collect, manage, protect, and share data in accordance with their principles of Indigenous data sovereignty (i.e., CARE Principles and The First Nations Principles of OCAP®). The specifics will vary depending on the type of research and the relevant communities. However, overall this means that grant recipients must ensure that the privacy and rights of indigenous and marginalized cultural groups are respected, and that confidential, proprietary, and sensitive data are appropriately protected [cite Arcadia Fund policy here; see Appendix].

Data related to research by and with Indigenous, local, afro descendent, and LGBTI communities, in accordance with the Belmont Forum DEIA statement must be managed in accordance with data management principles developed and approved by these communities. These include, but are not limited to considerations of data collection, ownership, governance, protection, use and sharing. For research conducted by and with Indigenous, local, afro descendent, and LGBTI communities, Data Management Plans (DMPs) submitted by grantees must be co-developed throughout the data lifecycle with these communities, collectives and organizations, in accordance with research data management principles or DMP formats that they accept. DMPs in the context of research by and with Indigenous, local, afro descendent, and LGBTI communities should recognize data sovereignty and include options for renegotiation of the DMP. For research conducted by and with Indigenous, local, afro descendent, and LGBTI communities, these communities will guide and ultimately determine how the data are collected, used and preserved, and have the right to repatriate the data. This could result in exceptions to the data deposit requirement.[1]

Instructions and resources for grantees

To meet the expectations of this Policy, we suggest grantees take the following steps:

1. **Data Planning:** Data Planning helps promote active and effective data management and stewardship in all Belmont Forum-funded research throughout the research life cycle, and works to enable harmonization of e-infrastructures through enhanced project data planning, monitoring, review and sharing.

    a. Grantees can refer to the Belmont Forum Data Management Plan Scorecard, which may be provided to grant reviewers, to understand what characteristics of the Data and Digital Outputs Management Plan (DDOMP) will be evaluated and how.

    b. The Data and Digital Outputs Management Plan asks questions to help researchers think about how to prepare and manage their project outputs to conform to the Belmont Forum Open Data Policy and Principles.

    c. For research conducted by and with Indigenous, local, afro descendent, and LGBTI communities, DDOMPs submitted by grantees must be co-developed with these communities, collectives and organizations, in accordance with research data management principles or DDOMP formats that they accept.[1]

    d. If the prospective project includes working with or about Indigenous communities, the DDOMP should include information on how grantees will collect, manage, and share data in accordance with the CARE Principles and other Indigenous data sovereignty guidelines.

[1] Language in these sections comes from Canada's Tri-Agency policy.

e. Belmont provides A Step-By-Step User Guide for Building a Successful Data Management Plan at each stage of the proposal and award process

f. Prospective grantees should submit their Data and Digital Outputs Management Plan (DDOMP) at the time of grant application according to the stage of the submission (i.e., Full Proposal submission, Awarded Projects).

g. Grantees can find accepted DDOMPs that follow both FAIR and CARE principles in the Belmont Forum Resource Library.

h. Financial support may be available to defer reasonable costs of data sharing, which could include those associated with data management, curation, hosting, and preservation. Grantees should confer with each specific Belmont Member funding their work to confirm allowable costs. Budgeting for data sharing is best done at the DDOMP stage of research planning.

2. **Data Management:** Promote good data management to help improve project efficiency, ease grant reporting, and facilitate eventual data sharing under this Policy. To better enable these outcomes, Belmont provides a number of resources to help grantees with data management:

    a. Data Management Training Inventory: Search training resources by geographic region, resource type, and professional role

    b. Data Management Best Practices & Standards: Includes a Data Policy Comparison Tool to help grantees understand the requirements of different Belmont Forum members, and a Data Skills Curricula Framework; can also search resources by organization, category, or geographic region

    c. Grantees can search the Belmont Forum Resource Library to see examples of shared datasets for ideas on to manage data and prepare it for sharing

3. **Data Sharing:**

    a. Deposit research data, research-related outputs, and accompanying metadata in a trusted publicly accessible repository with minimal time delay.

        i. The exact timing required for data sharing may vary depending on the Belmont Member providing funding. However, when possible, Belmont Forum recommends that data from a specific study be shared at the time of publication of the article describing the data.

        ii. Chosen repository should provide long-term preservation of and access to data, and assign persistent identifier (e.g. DOI) to data record

        iii. Gates Open Research and a team led by the American Geophysical Union provide guidance on selecting a repository; PLOS ONE has a list of

recommended repositories; or, grantees can search the Registry of Research Data Repositories or FAIRSharing.org

iv. If a discipline-specific repository is not available, Belmont members can share data outputs, in the Belmont Forum Zenodo community, a designated community for Belmont members. This politically neutral repository is a free and accessible option for members that follows international standards and FAIR principles. However, we recommend members choose repositories based on data sharing decisions made by their team. A full set of available generalist repositories is provided here in this comparison chart including Zenodo.

v. Belmont members may have their own lists of preferred repositories

b. Ensure ongoing access to research-related outputs other than data

i. Research-related outputs such as meeting reports, training documents, educational resources can be preserved in the Belmont Forum Zenodo community, a designated community for Belmont members. This generalist repository is a free and accessible option, adheres to international standards, and enables users to share research outputs according to FAIR principles.

ii. Software, code, and models should be preserved in Zenodo. For teams using GitHub as a development platform, the Zenodo bridge allows the version of software/code used in the research to be preserved and registered with a DOI.

iii. Physical Samples should be documented through an IGSN and follow the ESIP Physical Samples guidance for citation: A Scientific Author Guide for Publishing Open Research Using Physical Samples and their summary document: 4 Steps to Publish Open Earth Science Samples.

iv. Biological Samples are commonly identified with a Research Resource Identification (RRID). Follow the author guidelines template when using an RRID.

c. Alongside the data, share rich metadata that describes the dataset, its provenance, structure, meaning of any abbreviations or terms, etc., i.e. all the information necessary for others to understand and reuse the data.

i. The repository selected to preserve datasets can provide guidance for the type of documentation necessary to understand your data. When this guidance is not available, your community may have published best practices, and if not, the basic elements to include in a separate file with your data (e.g., README file) are: Title, investigator(s) contact information, date(s) of collection, geographic information, descriptive

terms, language information, funding sources, sharing/access information, data and file overview, methodological information, and data specific information. See Guide to writing "readme" style metadata from Cornell University which includes downloadable template README file.

ii. A list of some specific metadata standards can be found at the Digital Curation Centre or the Metadata Standards Catalog (originally developed by the Research Data Alliance).

d. Assign a permissive open license to data and metadata that allows for reuse.

i. General information about licensing data options that abide by FAIR principles can be found here: Creative Commons with more explanation by the Digital Curation Centre.

ii. To facilitate reuse, the Belmont Forum recommends sharing data under a public domain dedication, such as Creative Commons CC0. Grantees can find more information here on why CC0 is the recommended legal tool for sharing data.

iii. Other options include the Creative Commons Attribution (CC BY 4.0) or ShareAlike (CC BY-SA 4.0) licenses.

iv. Many repositories allow researchers to select their preferred license. For those who need guidance on the best licensing suited for your data, please see the Creative Commons licensing tool.

v. For data or information that is sensitive, we acknowledge that steps must be taken to protect privacy while still allowing for some sharing.

1. Data sharing decisions should be guided and approved by Indigenous, local, afro descendent, and LGBTI partnering communities. The protection and preservation of their data, cultural material, and knowledge must be prioritized when collectively choosing the most appropriate license. In accordance with CARE principles, Indigenous communities have the right to repatriate their data.

e. Make sure data and metadata are archived with persistent identifiers (DOIs).

i. Many repositories will automatically assign a DOI when data is uploaded, others may require the researcher to request a DOI be assigned.

f. When selecting a license specific for open source software, grantees can use this tool to make the best choice: Choose a License.

4. **Article Sharing**

    a. Given that datasets and key results are often described within journal articles, the Belmont Forum recommends publishing in Open Access journals. Where that is not possible, authors should share a copy of their Author Accepted Manuscript[2], in the Belmont Forum's Zenodo community using an open license such as CC BY 4.0.

    b. The Belmont Forum recommends awardees retain the necessary authorship rights to share a final, peer-reviewed copy of the research paper, regardless of the journal in which it is published.

        i. The authorship rights we refer to include free, immediate readership rights, and wide reuse rights.

        ii. These rights can be obtained by a Creative Commons Attribution (CC BY 4.0) license and by inserting language into the body of the manuscript at the time of submission which reads: "For the purpose of open access, the author has applied a Creative Commons Attribution (CC BY 4.0) license to any Author's Accepted Manuscript version arising from this submission."

        iii. Additional guidance for how to obtain necessary open readership right can be found on the Rights retention: A Primer from UKRN

Additional resources for grantees:

1. F1000 Getting Started Guide
2. Recommended Best Practices for Better Sharing of Climate Data (Available in English, French, and Spanish)
3. Open Data Policy Guidelines from Sunlight Foundation

[2] The Author Accepted Manuscript is the version of a paper that has been peer reviewed and accepted for publication by a journal. This version should include all changes made during the peer review process, though it generally does not include copyediting and stylistic edits or formatting changes.