Data and Digital Outputs Management Plan Template

Introduction

The Belmont Forum supports multi-national and transdisciplinary collaborative research, bringing together natural sciences, social sciences and the humanities, as well as stakeholders, to co-create knowledge and solutions for sustainable development. The Belmont Forum Challenge is to support international transdisciplinary research providing knowledge for understanding, mitigation, and adaptation to global environmental change.

To meet this challenge, the Belmont Forum emphasizes open sharing of research data and digital outputs to stimulate new approaches to the collection, reuse, analysis, validation, and management of data and information, thus increasing the transparency of the research process and robustness of the results.

Research data and digital outputs include, but are not limited to:

- Quantitative and qualitative digital information and objects created during or reused in research activities such as experiments, analyses, surveys, interviews, measurements, instrumentation, observations, video, audio, and computer simulations;
- All metadata describing the data and digital outputs, their acquisition (including model description and related metadata for simulations and workflows), and other details for the use and the reuse of the data;
- Secondary data resulting from data reduction, transformation, analyses, and results, together with the associated code, software, workflows, and provenance information;
- Stakeholder-oriented digital outputs such as maps (including GIS layers), decision support tools, tutorials, videos, local language resources, lesson plans, curricula, policy memos, and whitepapers; and
- Descriptions of, and metadata relating to, physical samples connected with the CRA - but not the actual physical samples.

Each project awarded through a Collaborative Research Action is required to develop and implement a Data and Digital Outputs Management Plan to ensure ethical approaches and compliance with the Belmont Forum Open Data Policy and Principles, as well as the FAIR Data Principles (Findable, Accessible, Interoperable, and Reusable).

The Belmont Forum is in the process of gradually integrating its Open Data Policy and Principles into the CRA process. This evolving process includes both the acculturation of researchers and Belmont member agencies to open data practices, and the increasing movement toward transdisciplinary environmental change research. For example, the Belmont Forum recognizes that some funding agencies may have their own data and digital output management requirements and that further specific and practical guidance may be needed for both proposers and funding agencies to address potential differences. However, the Belmont Forum expects that proposers will make every effort to thoroughly address the questions and criteria listed below (see: Full Proposal - Data and Digital Outputs Management Approach), and the Forum will evaluate the Data and Digital Output Management Plans accordingly.

Belmont Forum Data and Digital Outputs Management Planning Process

It is important to consider data management issues from the inception of a project in order to plan and budget appropriately for data curation, management, and sharing. This section explains the expectations for Data and Digital Outputs Management Plans at the stages of Full Proposal and Awarded Projects.

Full Proposal - Data and Digital Outputs Management Approach
In the Data and Digital Outputs Management section, please address the following questions:

1. What types of **datasets and other digital outputs of long-term value** do you expect the project will produce or reuse?
    - "Long-term" means those data and digital outputs that will or may be of value to others within your research community and/or the wider research, innovation, and stakeholder communities.
2. How do you intend to **ensure that the data and digital outputs from your project conform to** the Belmont Forum Open Data Policy and Principles, and the FAIR principles.
3. Which **member(s) of your team will be responsible** for developing, implementing, overseeing, and updating the Data and Digital Outputs Management Plan?
4. How do you intend to **manage the data and digital outputs** during the project to ensure their long-term value is protected?
    - For example, where will the data be held during the project, who will have access, and will a specialised data manager be part of the project team?
5. How and by whom will the data and other digital outputs be **managed after the project ends** to ensure their long-term accessibility?
    - For example, will the outputs be published with a Persistent Unique and Resolvable Identifier (such as a Digital Object Identifier:DOI, Accession Number, Handle, etc.), and be placed in a recognised, trustworthy long-term domain or other repository or data centre. When will this occur? (Further information about repositories include, but are not limited to, the Re3data.org registry of research data repositories, CoreTrustSeal list of certified data repositories, etc.)
6. **What restrictions, if any,** do you anticipate **could be placed on** how the data and digital outputs can be accessed, mined, or reused?
    - Belmont Forum policy is that the data should be as open as possible to commercial and non-commercial users, though with managed access where appropriate and necessary, for example, if there are sensitive data involving human subjects.
7. How will you ensure that any **data security, privacy, and intellectual property restrictions** associated with datasets and digital outputs will be honored and preserved in derivative products?
8. What **supporting documentation and other information** (e.g., metadata) do you plan to make publicly accessible to support the longer-term reuse of the data and digital outputs?
9. How have you accounted for the **costs** required to manage the data and digital outputs to ensure long-term accessibility?

Awarded Projects - Full Data and Digital Outputs Management Plan
A full Data and Digital Outputs Management Plan for an awarded Belmont Forum project is a living, actively updated document that describes the data management life cycle for the data and other digital outputs to be collected, reused, processed, and/or generated. As part of making research data open by default, findable, accessible, interoperable, and reusable (FAIR), the Plan should elaborate on the information provided at the Full Proposal stage, and include the following additional information:

1. Agreed standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies);
2. Policies for broad access and sharing, including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements;
3. Policies and provisions for mining, reuse, re-distribution, and the production of derivatives;

4. Contact information for the person(s) responsible for updating the Data and Digital Outputs Management Plan as needed to comply with these guidelines; and
5. A list of anticipated trustworthy, long-term repositories or data centers that will be used to ensure preservation of access to data and digital outputs following completion of the project.

A more detailed Data and Digital Outputs Management Plan template will be made available to funded Belmont Forum project leads at the Award Stage.

Additional Resources and Guidance

Project-specific Data and Digital Outputs Management Plans should be compatible with the Belmont Forum Open Data Policy and Principles and the FAIR Data Principles and adhere to relevant standards and community best practices, which may vary by subject and disciplinary area. Data and Digital Outputs Management Plans should also comply with public access policies and applicable national laws for the respective funding agencies supporting CRA awards. Research data and digital outputs should be open by default and publicly accessible, possibly after a short period of exclusivity, unless there are legitimate reasons to constrain access. Data and digital outputs must be discoverable through machine readable catalogues, information systems and search engines.

To enable data and digital outputs (including models, workflows, software and methods, etc.) with acknowledged long-term value to be discoverable, accessible, understable, interoperable and effectively reused by others (including those outside the discipline of origin and the context of acquisition), sufficient metadata must be provided and made openly accessible. Data and digital outputs must be curated, including maintaining integrity, quality and veracity, using internationally or community agreed standards and protocols. Data and digital outputs must be preserved, protected from loss, and remain accessible and usable for future research in sustainable and trustworthy repositories.

Resulting publications must list where or how to locate the underlying supporting data and other research materials, including agreed persistent identifiers, processing details and any workflows, software, and code. Academic journals may also set specific requirements for Data Accessibility Statements to be included within published research results (primary research articles).

Researchers must ensure that metadata created to support research datasets and other digital outputs retained for the long-term is sufficient to allow other researchers a reasonable understanding and trust of those materials, thereby minimising unintentional misuse, misinterpretation, or confusion.

In the development of data infrastructures, it is important to leverage existing resources, platforms, standards, and recognized practices together with a clear sustainability plan. Projects that propose to develop data infrastructures are requested to work closely with and support relevant international networks, infrastructures, and standards organisations. They should make as much use as possible of existing certified domain, national or international data repositories (for further information, possible resources include, but are not limited to, re3data.org, CoreTrustSeal, Group on Earth Observations, FAIRsharing.org, etc.). Projects should also coordinate with, and make use of, the products and practices developed by recognized research and operational data policy and sharing organisations such as the Research Data Alliance (RDA), Committee on Data for Science and Technology (CODATA), and the ICSU-World Data System (WDS).

For assistance in developing data and digital outputs management plans, project leaders are encouraged to first consult with relevant domain repositories, librarians and information specialists at their respective institutions. When appropriate repositories have been identified for depositing and sharing data and digital outputs, staff at these repositories can provide additional guidance on the preparation of data and digital outputs management plans, as well as processes for fulfilling specific requirements for organizing and formatting data and metadata.

Additional, general support for data management planning can be obtained through recognized organizations, including, but not limited to:

- Digital Curation Center (DCC, UK)
- University of California Curation Center (UC3, USA)
- Earth Science Information Partners Data Management Training Clearinghouse (ESIP DMTC, USA)
- Australian National Data Service (ANDS)
- Data Archiving and Network Services (DANS, The Netherlands)
- Global Biodiversity Information Facility (GBIF)
- ELIXIR
- Data Intensive Research Initiative of South Africa (DIRISA)
- OpenAire (European Commission)
- Optimisation du Partage et de l'Interopérabilité des Données de la Recherche (OPIDoR, France)
- Instituto de Engenharia de Sistemas e Computadores - Investigação e Desenvolvimento (INESC-ID, Portugal)
- Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA, Spain)