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Recommendation on research data documentation from the Open Science, Research Data Management Support

This document aims to provide a guideline to PhD students, PostDocs, and research staff at the University of Bern (UniBE) how to document research data in a sufficient and understandable way, allowing data use and reuse. The recommendations were created by the Open Science Team of the University Library of Bern together with the Institute of Tissue Medicine and Pathology.

1. Data documentation

All research activities performed in / or during employment at the University of Bern should systematically and thoroughly document their data according to the specific requirements of each research group, but generally in a way that they are findable, understandable, citable and reusable for any peer in the same field, according to the FAIR principles (Findable, Accessible, Interoperable, Reusable).

To comply with funding agencies' regulations and to follow the good scientific practice, a research Data Management Plan (DMP) should be provided, which helps sufficiently document research data and maximize data re-usability (see DMP Videos and Slides https://youtu.be/tdraMYFcnYQ or check information about data documentation as well as documentation tools). RDMkit provides useful links to some tools and resources, see also Tools in Research Data Management (RDM).

Proper data documentation includes:

- Metadata information (information about your data) on
  - **Who** created the data?
  - **What** is the content of the data?
  - **Why** were the data developed?
  - **Where** is geographically located (origin of the dataset)?
  - **When** were the data created?
  - **How** were the data produced?

  Metadata should conform to metadata standards that ensure interoperability of metadata across different databases and software applications. Some widely used standards for basic information about data are Dublin Core and Data Cite. A special type of metadata that helps to describe dataset contents in a consistent way is controlled vocabularies (examples can be found here).

  Controlled vocabularies and metadata standards differ from one research discipline to another; therefore, we advise you to contact Research Data Management Team at the Open Science, Bern University Library (email: openscience@unibe.ch).
- Folder structure and file organization (how files relate to each other)
- File names
- File formats
- Abbreviations list (explanation of all used abbreviations with file and folder names)
- Version control
- Data backup
- ReadMe file or codebooks can be used for documentation description, which contain information about data creator, data collector, data manager, data curator etc, project title, PI, affiliation, variables description, steps undertaken in processing and analyzing data, software requirements, link to methodological part, explanation of data used, generated, incl. units of measurement). Readme_Template_EN.txt (3KB)

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Data produced in laboratories can be documented using Electronical Laboratory Notebooks (ELN) or Laboratory Information Management Systems (LIMS, e.g., OpenBIS). The Data Science Lab (DSL) provides support on OpenBIS Bootstrap. If associated electronic files and / or protocols generated during the experimental work described in these files exist, they must remain in the laboratories when the investigating scientists leave the institution. The scientists may make copies of any of his/her notebooks used (including electronic files) to take with him/her (should be preliminarily discussed with Group or Project Leaders / Lab Heads). Similarly, digital data including digital lab-books should be stored in an organized and understandable manner, in a dedicated electronic data storage platform recognized by the Institute / Faculty at the University of Bern or Insel Hospital.
Research data and supplementary data documentation should be stored for at least 10 years (except for studies with implantable medical devices, see section 2).

2. Research involving data and biosamples form patients, and experimental animals

Any research activities involving patient-derived biological samples and/or patient data must be planned, conducted and documented in accordance with the Swiss Human Research Act (Humanforschungsgesetz) and Swiss data protection regulations. Data obtained within clinical trials conducted under the Human Research Act, ClinO-MS, **Art. 40** (including studies with implantable medical devices) should be stored for 15 years.

Research involving experimental animals (3Rs-Replace, Reduce, Refine) needs to be recorded as requested by the local animal experimentation committee and Animal Welfare Office at the UniBE and data obtained within the research projects should be properly documented (see section 1).

3. Hand-over of notebooks, protocols, biosamples and critical reagents at the end of the appointment

Notebook files (hard copies, electronic files) including data and experimental protocols, biological materials, reagents created and/or critical for replicating experimental work done by the leaving scientist need to be handed over in a well-documented, retrievable manner to the principal investigator (PI) and/or designated personnel in the respective research lab. If applicable, documentation and archiving of the research data needs to be done according to FAIR principles (findable, accessible, interoperable, reusable).

The appropriate hand-over of the listed materials needs to be confirmed by the Principal Investigator (PI) on the “sign-out form” handed over by Human Resources (HR) to the leaving scientist/staff. The form can be subject-specific for each faculty. Appropriate documentation of the experimental procedures and results obtained will also be required for determining the author's rights/intellectual property.

4. Publishing research data and associated dataset documentation

To comply with the funding agencies’ regulations and requirements in Open Science and Research Data (e.g., Swiss National Science Foundation, EU-Commission
Annotated Grant Agreement (see AGA, v.1, draft from 01.04.2023, p. 278-279), and the NIH-National Institutes of Health) as well as good scientific practice, the data and supplementary data documentation should be publicly accessible in digital data repositories if there are no legal, ethical, copyright or other issues.

We recommend to use of appropriate subject-specific repositories for the publication of research data (see https://www.re3data.org). At the University of Bern, BORIS Portal Research Data repository (https://boris-portal.unibe.ch/) can be used by researchers to publish research data and supplementary documentation (see section 1 and details here). Data Management Plans and protocols can be published along with datasets as supplementary documentation (not mandatory).

Based on the Data Protection Regulation of the Canton Bern and the Federal Act on Research Involving Human Beings (https://www.fedlex.admin.ch/eli/cc/2013/617/en), BORIS research data

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repository of the University of Bern (UniBE) cannot accept personal data. Direct or indirect personal identifiers must be removed from the data, or data must be aggregated before they can be uploaded. Researchers can determine under which conditions data will be accessible for external users (Open, Embargoed, Restricted, Closed or Metadata only). In case of “Embargoed”, “Restricted” or “Closed” data, it is recommended to upload a Data Transfer and Use Agreement (DTA). For detailed information please get in contact Open Science Team, University Library of Bern, email: openscience@unibe.ch.

Information about granted projects can also be added and published on BORIS Portal to facilitate transparency about funded projects and the research activities of the University of Bern for a broad public.