FAIR Research Data Management & Data Management Plan

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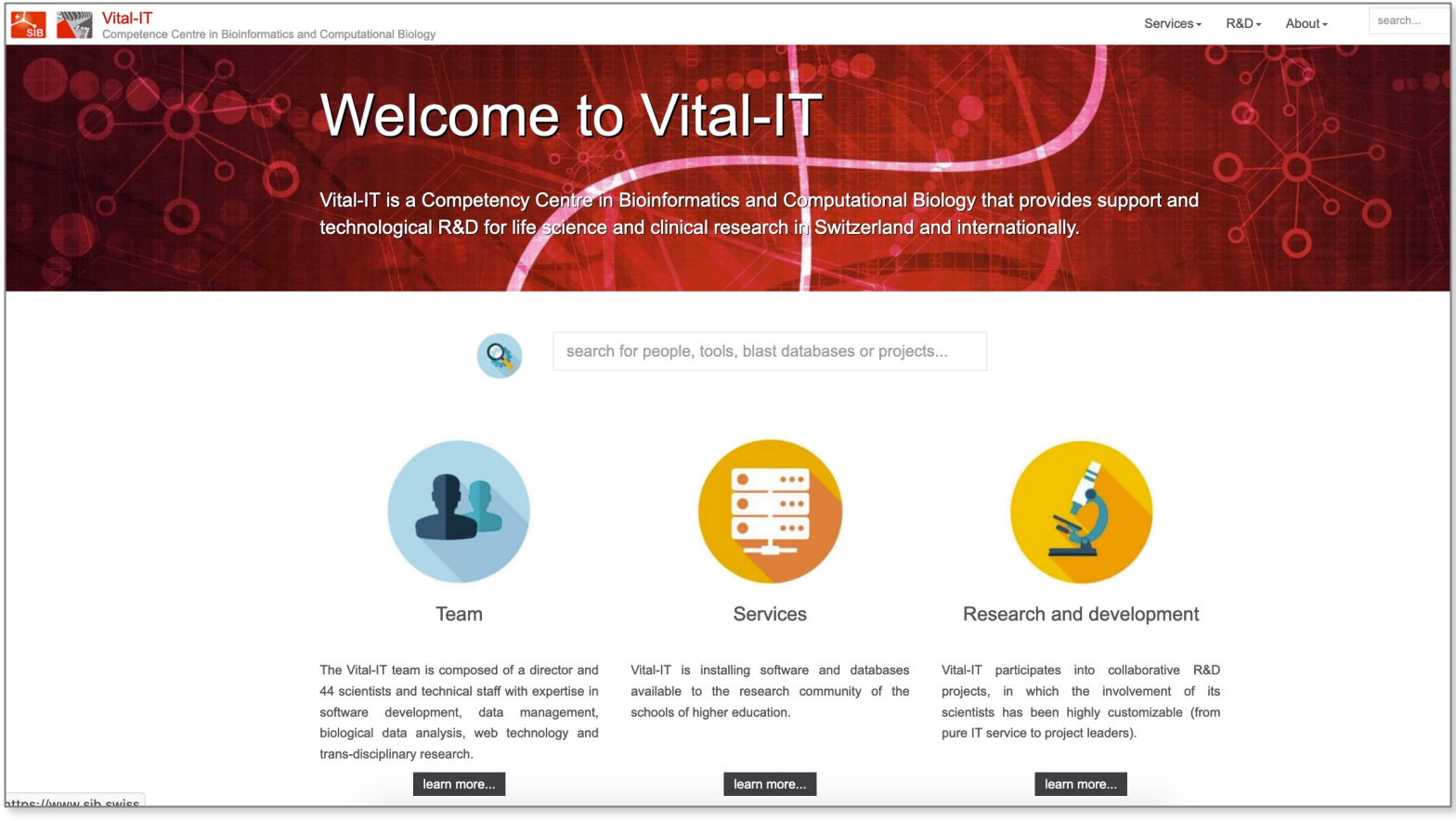
Vital-IT & CHUV Library
FAIR RDM - 2023

SIB / Vital-IT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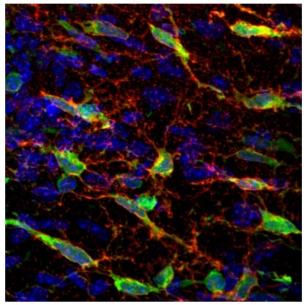
Home > Publication & Open Access > Data management & Open Research Data



- Tools and services for research data management (DMP and ORD)
- Workhops on DMP and FAIR data/ORD
- Tools and services for Long Term Storage (LTS) /archiving of your data at UNIL
- Journal and funding agencies Open Data policies
- Where to publish your datasets: Data repositories
- Metadata standards
- File formats for long-term preservation and re-use
- Citation for a dataset
- Research data confidentiality
- Intellectual property for datasets
- Publish your dataset in data journals
- Find datasets on Open Data repositories

Data management & Open Research Data

In order to build on previous findings, improve transparency and increase results reproducibility, it is important for researchers to be able to re-use research data. For all these reasons, the notion of publication has been evolving over the last ten years and today includes not only the results, but also the essential research data needed to validate the results.

- Definition of research data +
- Data life cycle +
- Source of information +

Head of Data Management Service

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https://www.bium.ch/en/publication-open-access/data-management/

Objectives

During this workshop you will learn

- best practices in data management
- FAIR data principles
- how to collect, describe, store, secure and archive data
- file formats for long term datasets storage and re-use
- metadata standards for datasets,
- policies on confidentiality and intellectual property
- journal & funding agencies policies on data sharing
- how to share your datasets related to your publication
- how to fill a DMP corresponding to your project research

Outline

1. **Introduction**
   a. Open Research, Reproducibility & Funding Agencies
   b. Research Data Management (RDM)
      FAIR principles - Data Life Cycle

2. **Planning Phase**
   a. Data Management Plan (DMP)
   b. Ethical & legal aspects

3. **Active phase: Collect, Process, Analyze**
   a. Collect, Process, Analyze Data
   b. Data Documentation & Metadata
   c. Data Access Management & Storage

4. **Concluding Phase: Preservation & Sharing**
   a. Data Preservation (cold storage)
   b. FAIR Principles In Depth
   c. Data Sharing & Reuse (repositories, licenses)

1. INTRODUCTION

a. Reproducibility and Open Research Data

Poll 1: Open Research Data

What are the advantages for you, researchers and the scientific community to make published works and accompanying datasets freely accessible and reusable through Open Access (OA)?

Select the 3 answers that best correspond to you

- ❑ Verification of published research
- ❑ Preserving accessibility to data
- ❑ Allowing reuse and repurposing of data
- ❑ Improved methodologies
- ❑ Higher diffusion and visibility for the authors' work
- ❑ Higher citation rate of your publications
- ❑ Fulfillment of funding mandate
- ❑ Foster collaboration
- ❑ Accelerate innovation

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Advantages and disadvantages of Open Research Data

Editorial Anaesthesia 2023, 78, 551–556

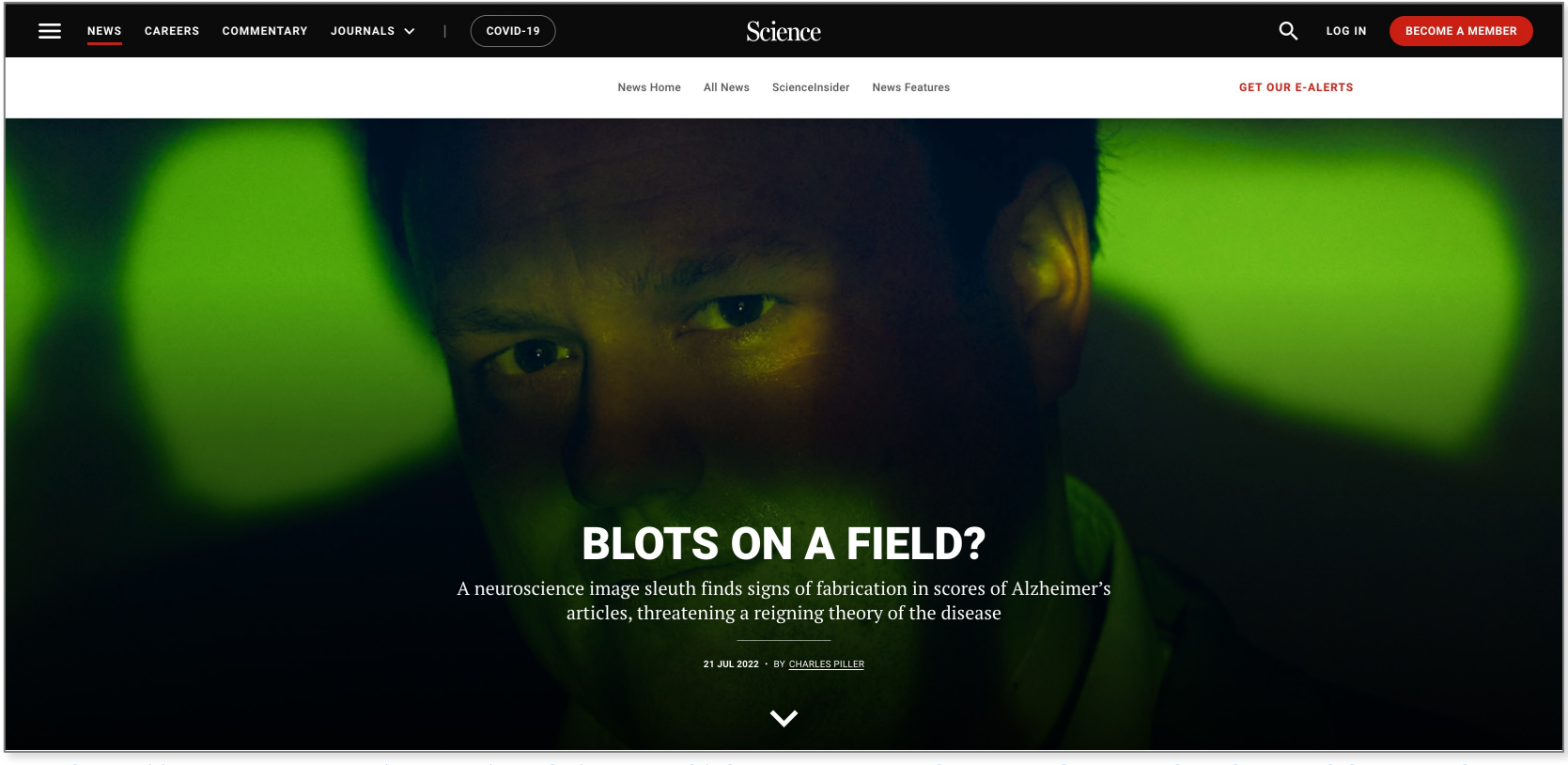
Table 1 Advantages and drawbacks of the open science movement.

Advantages	Disadvantages
Transparency, reproducibility and mitigation against data manipulation	Increased workload for authors to supply repositories with appropriately deidentified data
Increased rigour in peer review	Unclear which repositories most appropriate
Public access to publicly funded research	Risk of complex data misinterpretation
Acceleration of discoveries	Risk of data misuse (dual-use dissemination)
Financial savings in access, labour and transaction costs	Additional administration for authors to obtain ethical and institutional data sharing agreements
Increased impact of publications	Loss of data ownership

Open science should be a pleonasm
A. Dos Santos Rocha, E. Albrecht, K. El-Boghdadly

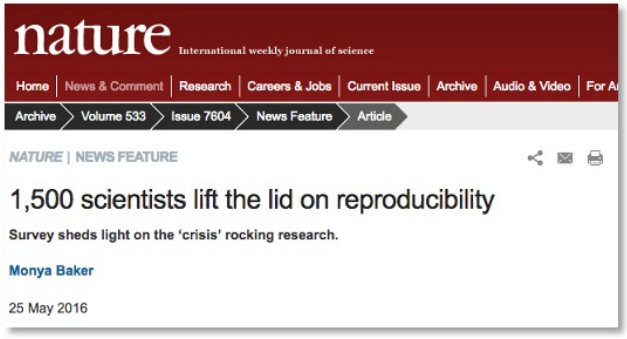
Context: basic, translational and clinical research validity under controversy

Falsification of results



https://www.science.org/content/article/potential-fabrication-research-images-threatens-key-theory-alzheimers-disease

Reproducibility crisis: researchers' view



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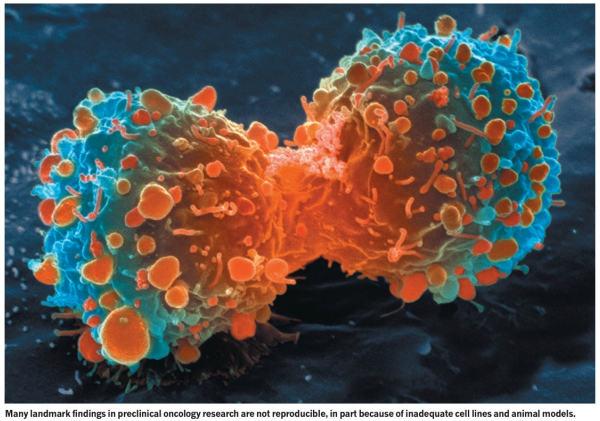
http://www.nature.com/news/reality-check-on-reproducibility-1.19961

Preclinical research validity under controversy

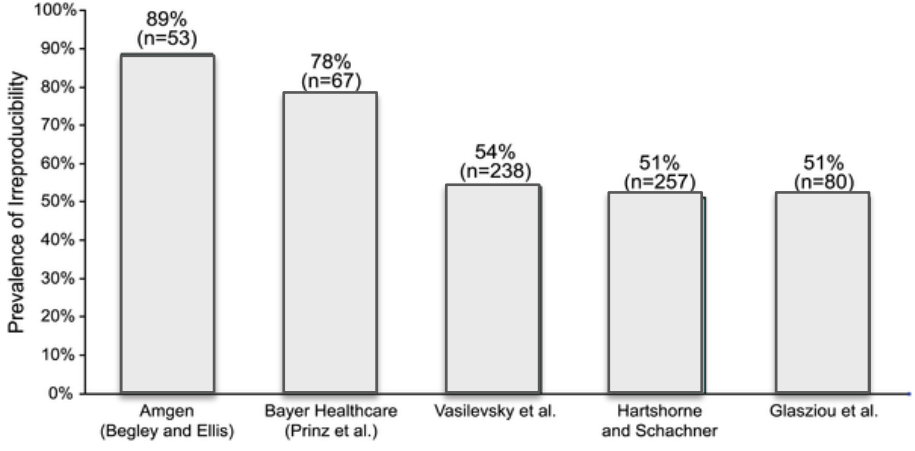


Many landmark findings in preclinical oncology research are not reproducible, in part because of inadequate cell lines and animal models.

Raise standards for preclinical cancer research

C. Glenn Begley and **Lee M. Ellis** propose how methods, publications and incentives must change if patients are to benefit.

https://www.nature.com/articles/483531a



nature reviews drug discovery

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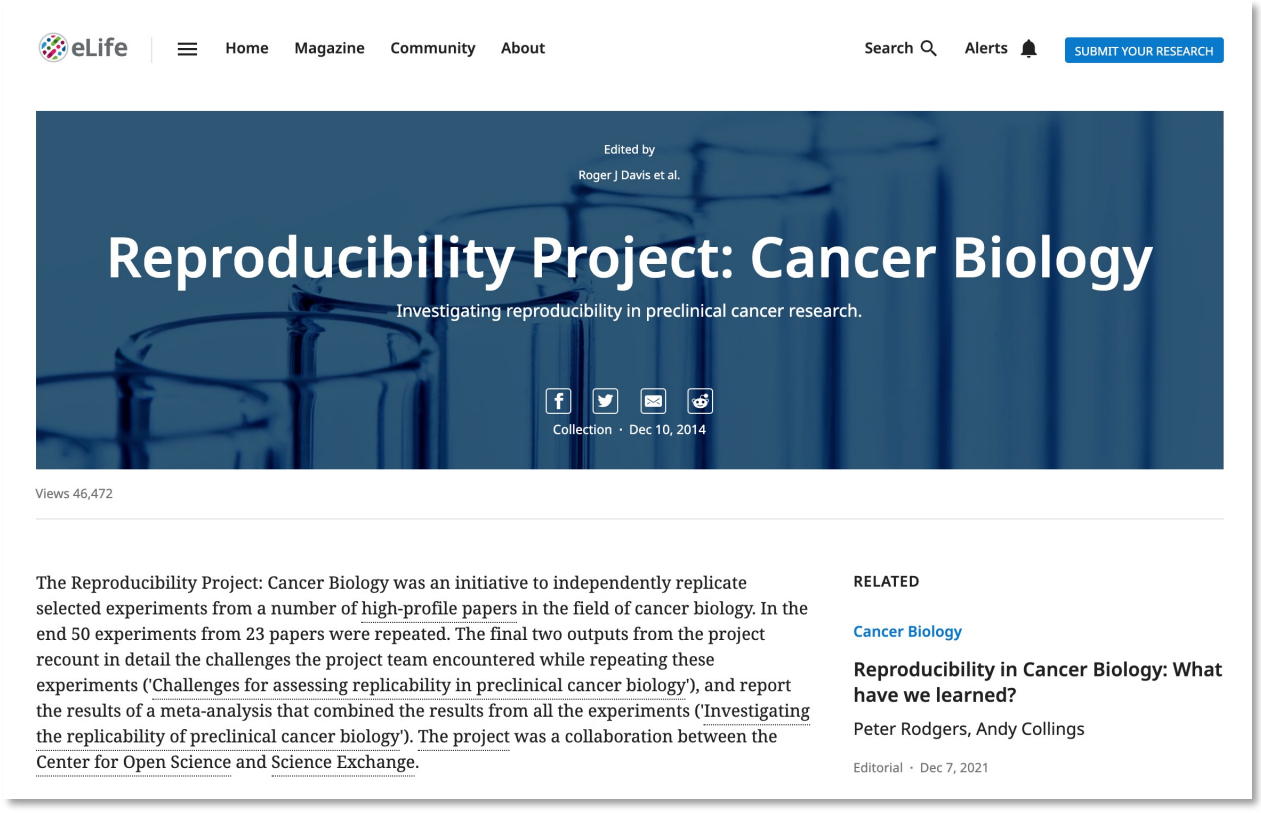
NEWS IN BRIEF | 13 January 2022

Preclinical cancer research suffers another reproducibility blow

https://elifesciences.org/articles/71601

PLOS

Investigating the replicability of preclinical cancer biology



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Edited by
Roger J Davis et al.

Reproducibility Project: Cancer Biology

Investigating reproducibility in preclinical cancer research.

Collection · Dec 10, 2014

Views 46,472

The Reproducibility Project: Cancer Biology was an initiative to independently replicate selected experiments from a number of high-profile papers in the field of cancer biology. In the end 50 experiments from 23 papers were repeated. The final two outputs from the project recount in detail the challenges the project team encountered while repeating these experiments ('Challenges for assessing replicability in preclinical cancer biology'), and report the results of a meta-analysis that combined the results from all the experiments ('Investigating the replicability of preclinical cancer biology'). The project was a collaboration between the Center for Open Science and Science Exchange.

RELATED

Cancer Biology

Reproducibility in Cancer Biology: What have we learned?

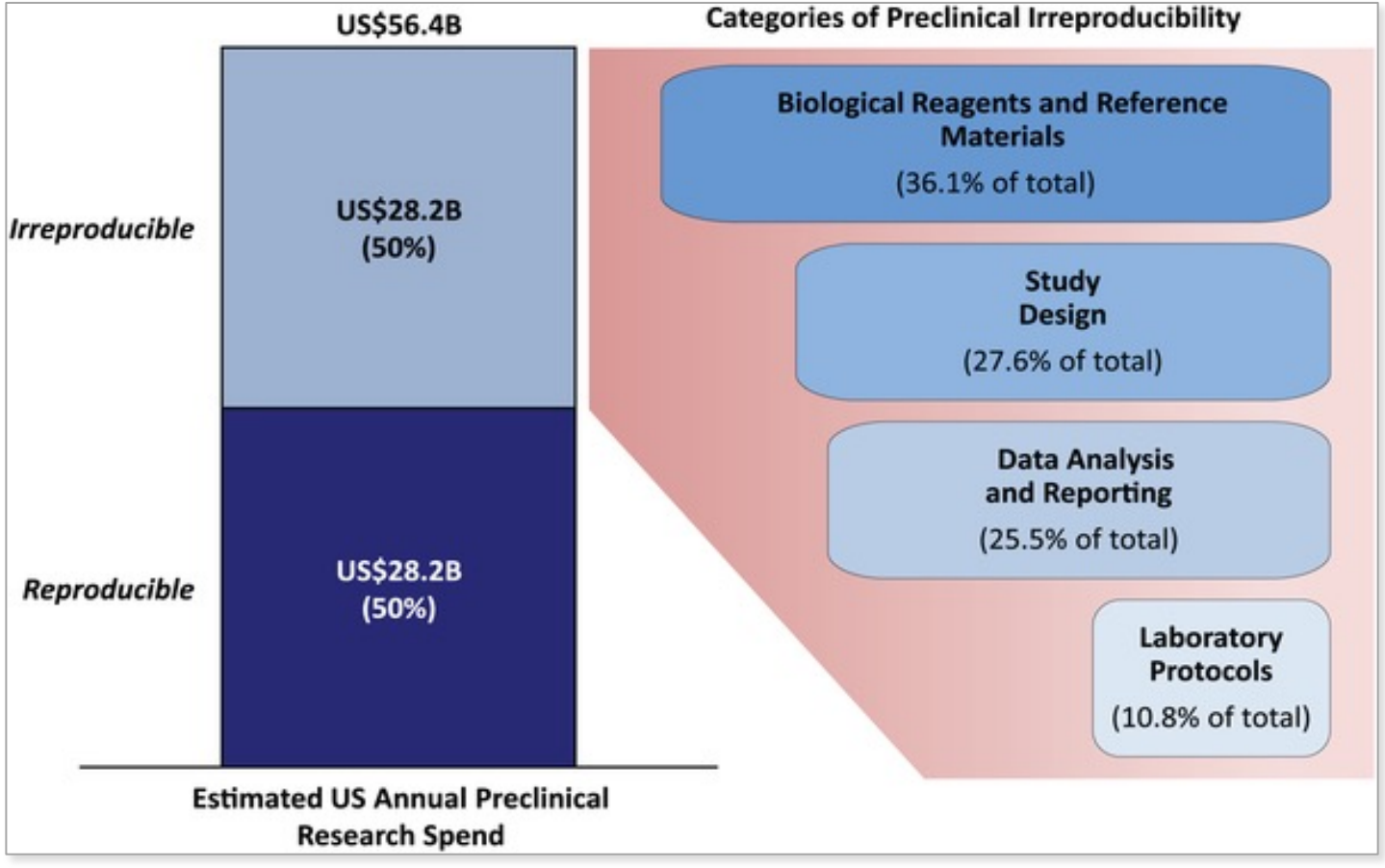
Peter Rodgers, Andy Collings

Editorial · Dec 7, 2021

https://elifesciences.org/articles/71601

- 50 experiments from 23 papers were repeated, replicability of 158 effects.
- 92% of replication effect sizes were smaller than the original.
- 46% of replications (51/112) succeeded.

Research expenses and errors contributing to irreproducibility



Journals: Open Data policies & reporting standard guidelines

THIS WEEK

EDITORIALS

CONSERVATION Saving species is far from a walk in the park p.8

WORLD VIEW Psychology gears up to check its workings p.9

BREAKFAST Chimps plan days to ensure they nab tastiest figs p.11

Journals unite for reproducibility

Consensus on reporting principles aims to improve quality control in biomedical research and encourage public trust in science.

EDITORIAL

Journals unite for reproducibility

Reproducibility, rigor, transparency, and independent verification are cornerstones of the scientific method. Of course, just because a result is reproducible does not necessarily make it right, and just because it is not reproducible does not necessarily make it wrong. A transparent and rigorous approach, however, can almost always shine a light on issues of reproducibility. This light ensures that science moves forward, through independent verifications as well as the course corrections that come from refutations and the objective examination of the resulting data.

It was with the goal of strengthening such approaches in the biomedical sciences that a group of editors representing over 30 major journals, representatives from funding agencies, and scientific leaders assembled at the AAAS headquarters in June of 2014 to discuss principles and guidelines for preclinical biomedical research. The gathering was convened by the U.S. National Institutes of Health, *Nature*,* and *Science*.

The discussion ranged from what journals were already doing to address reproducibility and the effectiveness of those measures, to the magnitude of the problem and the cost of solutions. The attendees agreed on a common set of Principles and Guidelines in Reporting Preclinical Research (www.nih.gov/about/reporting-preclinical-research.htm) that list proposed journal policies to promote transparency and reproducibility. The guidelines recommendations for authors their policies to ensure the statistical accuracy of data, limits should not discourage using a checklist to ensure peers, such as standards of method of randomization

menters were blind to the conduct of the experiment, how the sample size was determined, and what criteria were used to include or exclude any data. Journals should recommend the deposition of data in public repositories where available and link data bidirectionally to the published paper. Journals should strongly encourage, as appropriate, that all materials used in the experiment be shared with those who wish to replicate the experiment. Once a journal publishes a paper, it assumes the obligation to consider publication of a refutation of that paper, subject to its usual standards of quality.

The more open-ended portion of the guidelines suggests that journals establish best practices for image-based data (such as screening for manipulation and storing full-resolution archival versions) and how to describe experiments more completely. An example for animal experiments is reporting the source, species, strain, sex, age, husbandry, inbred and strain characteristics, or transgenic animals, etc. For cell lines, one might report the source, authentication, and mycoplasma contamination status. The existence of these guidelines does not obviate the need for replication or independent verification of research results, but should make it easier to perform such replication.

Some of the journals at the meeting already had implemented all or most of these principles and guidelines. But the important point is that a

"...scientific journals are standing together in their conviction that reproducibility and transparency are important..."

Marcia McNutt
Editor-in-Chief
Science *Journals*

http://www.nature.com/news/journals-unite-for-reproducibility-1.16259
http://www.sciencemag.org/content/346/6210/679.long

- Transparency and Openness Promotion (TOP) guidelines adoptées par 560 journaux et 49 associations. *B. A. Nosek et al. Science 2015;348:1422-1425*

- Principles and Guidelines in Reporting Preclinical Research set up by NIH, Nature and Science.

- All papers with Data policies: NPG, Cell Press, PLoS, Science, EMBO, PNAS, Lancet, BMJ, BMC, ….

No raw data, no science: another possible source of the reproducibility crisis

Molecular Brain

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Editorial | Open Access | Published: 21 February 2020

No raw data, no science: another possible source of the reproducibility crisis

Tsuyoshi Miyakawa

Molecular Brain **13**, Article number: 24 (2020) | Cite this article

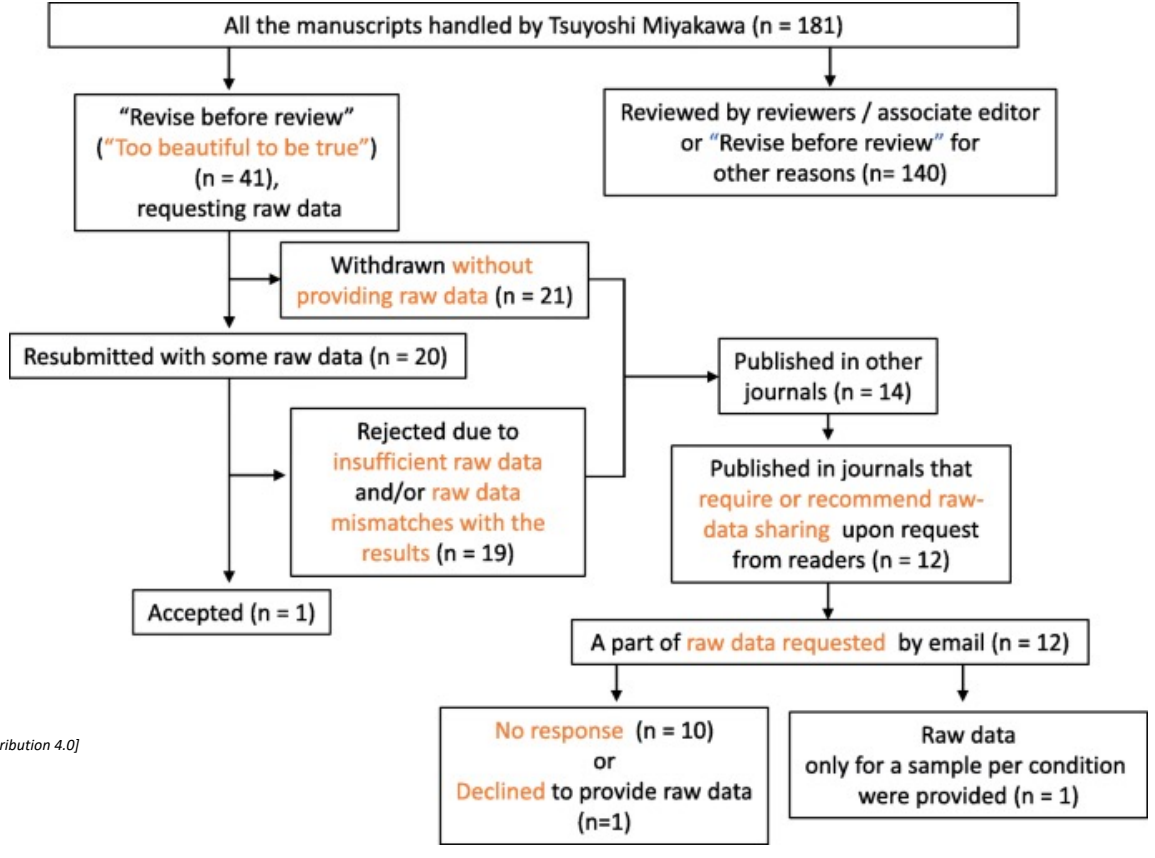
59k Accesses | **92** Citations | **2158** Altmetric | Metrics

Abstract

A reproducibility crisis is a situation where many scientific studies cannot be reproduced. Inappropriate practices of science, such as HARKing, p-hacking, and selective reporting of positive results, have been suggested as causes of irreproducibility. In this editorial, I propose that a lack of raw data or data fabrication is another possible cause of irreproducibility.

As an Editor-in-Chief of *Molecular Brain*, I have handled 180 manuscripts since early 2017 and have made 41 editorial decisions categorized as "Revise before review," requesting that the authors provide raw data. Surprisingly, among those 41 manuscripts, 21 were withdrawn without providing raw data, indicating that requiring raw data drove away more than half of the manuscripts. I rejected 19 out of the remaining 20 manuscripts because of insufficient raw data. Thus, more than 97% of the 41 manuscripts did not present the raw data supporting their results when requested by an editor, suggesting a possibility that the raw data did not exist from the beginning, at least in some portions of these cases.

https://molecularbrain.biomedcentral.com/articles/10.1186/s13041-020-0552-2



Swiss Funding Agency policy on Open Research Data

SNSF values research data sharing as a fundamental contribution to the impact, transparency and reproducibility of scientific research.

Since October 2017:

- Researchers have to provide a DMP as an integral part of their research proposal.
- SNSF expects that metadata and data generated by funded projects will be publicly accessible in non-commercial, public repositories provided there are no legal, ethical, copyright or other issues.

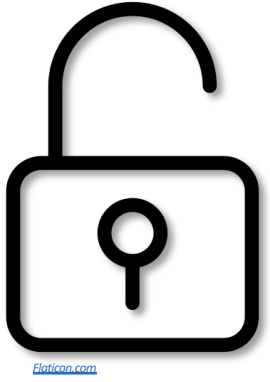
More information

1. INTRODUCTION

b. Research Data Management (RDM)

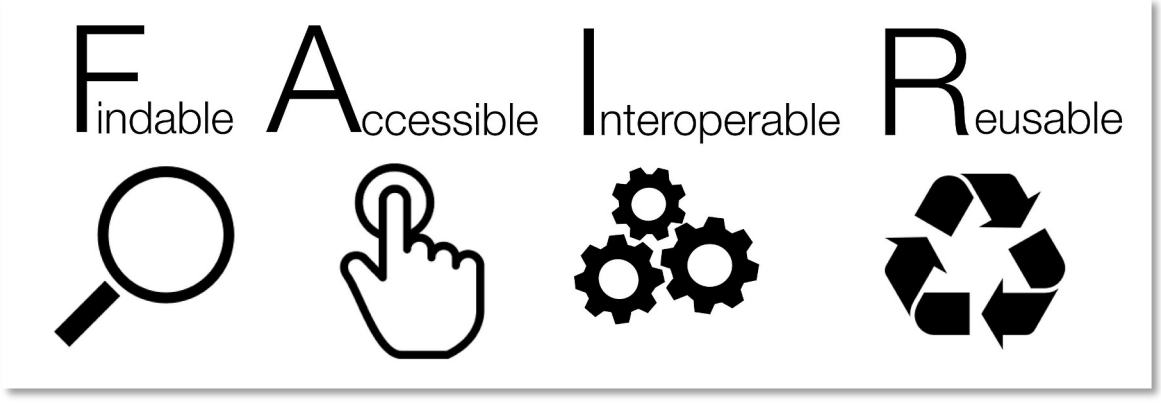
FAIR principles - Data Life Cycle

Open Research Data (ORD) Principles



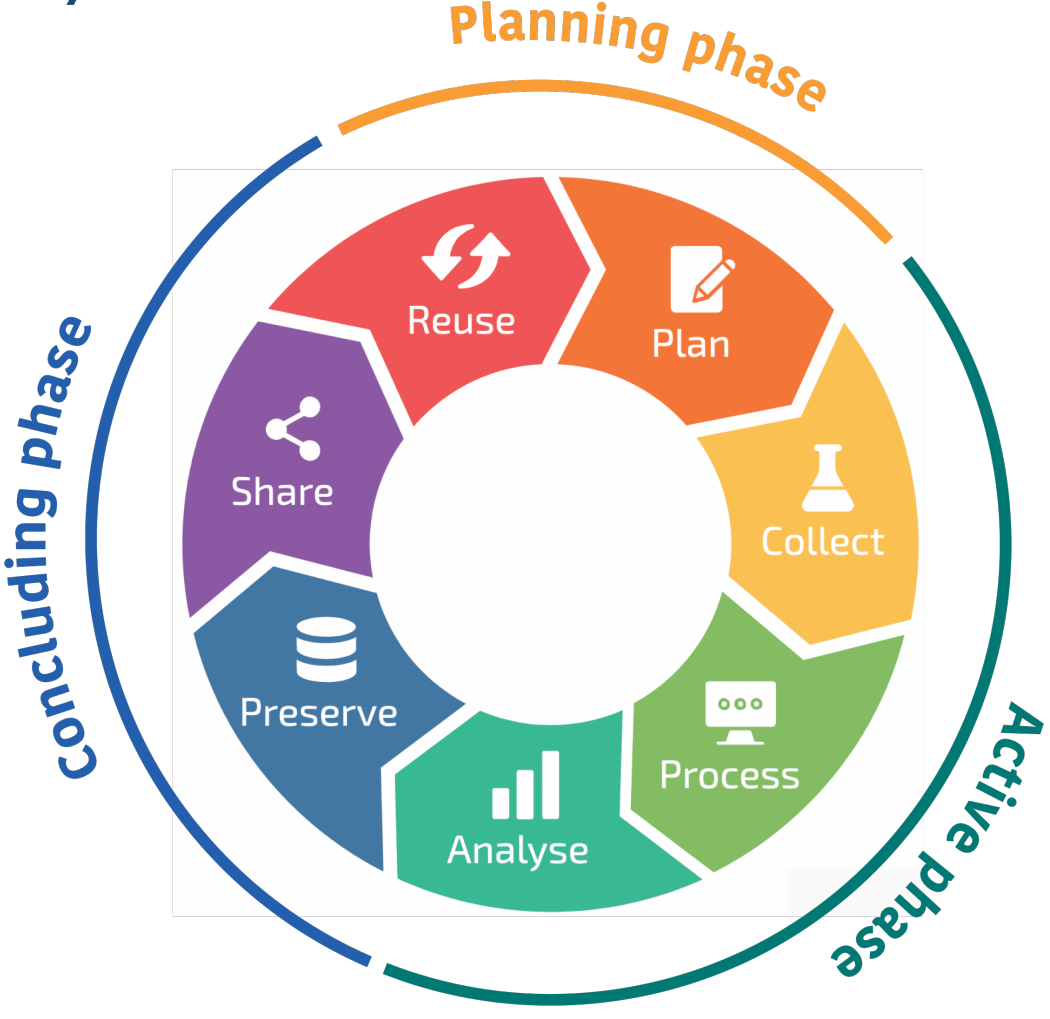
ORD values research data sharing as a fundamental contribution to the impact, transparency and reproducibility of scientific research.

≠ The FAIR Principles



https://commons.wikimedia.org/wiki/File:FAIR_data_principles.jpg

Data Life Cycle



Adapted from https://rdmkit.elixir-europe.org/data_life_cycle

Overview of a project's phases

Planning Phase

Reuse → Plan

- Reuse of previous data
- Requirement from funding agencies
- Research integrity
- Legal framework Ethical issues

Active Phase

Collect ⇄ Process ⇄ Analyse

- Storage and backup
- Data access management- security
- Data access management- sharing
- Metadata and Documentation

Concluding Phase

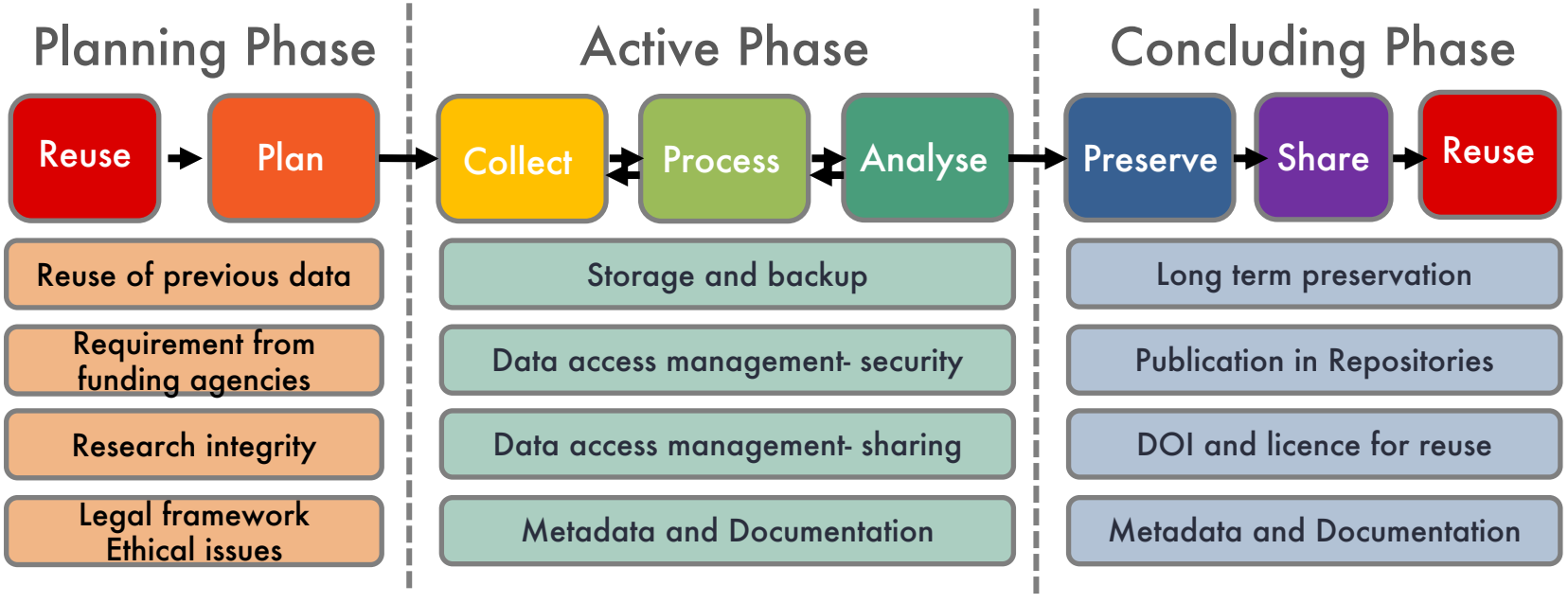
Preserve → Share → Reuse

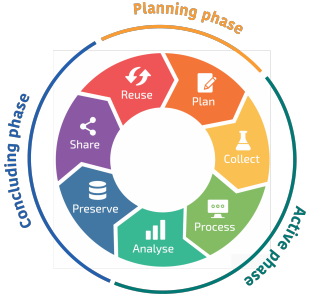
- Long term preservation
- Publication in Repositories
- DOI and licence for reuse
- Metadata and Documentation

2. PLANNING PHASE

a. Data Management Plan

Data Management Plan





Content

- anticipate in detail the management of your research data (analyses, organization, storage, security and sharing)
- specify the type of data
- budget, intellectual property, and monitoring over time.

Video “The what, why and how of data management planning”

https://www.youtube.com/watch?v=gYDb-GP1CA4

SNFS DMP
Practical aspects

Information: SNSF guidelines for researchers

SNSF guidelines for researchers

The SNSF has elaborated guidelines for researchers concerning the Data Management Plans (DMPs).
Guidelines and Content of the DMP

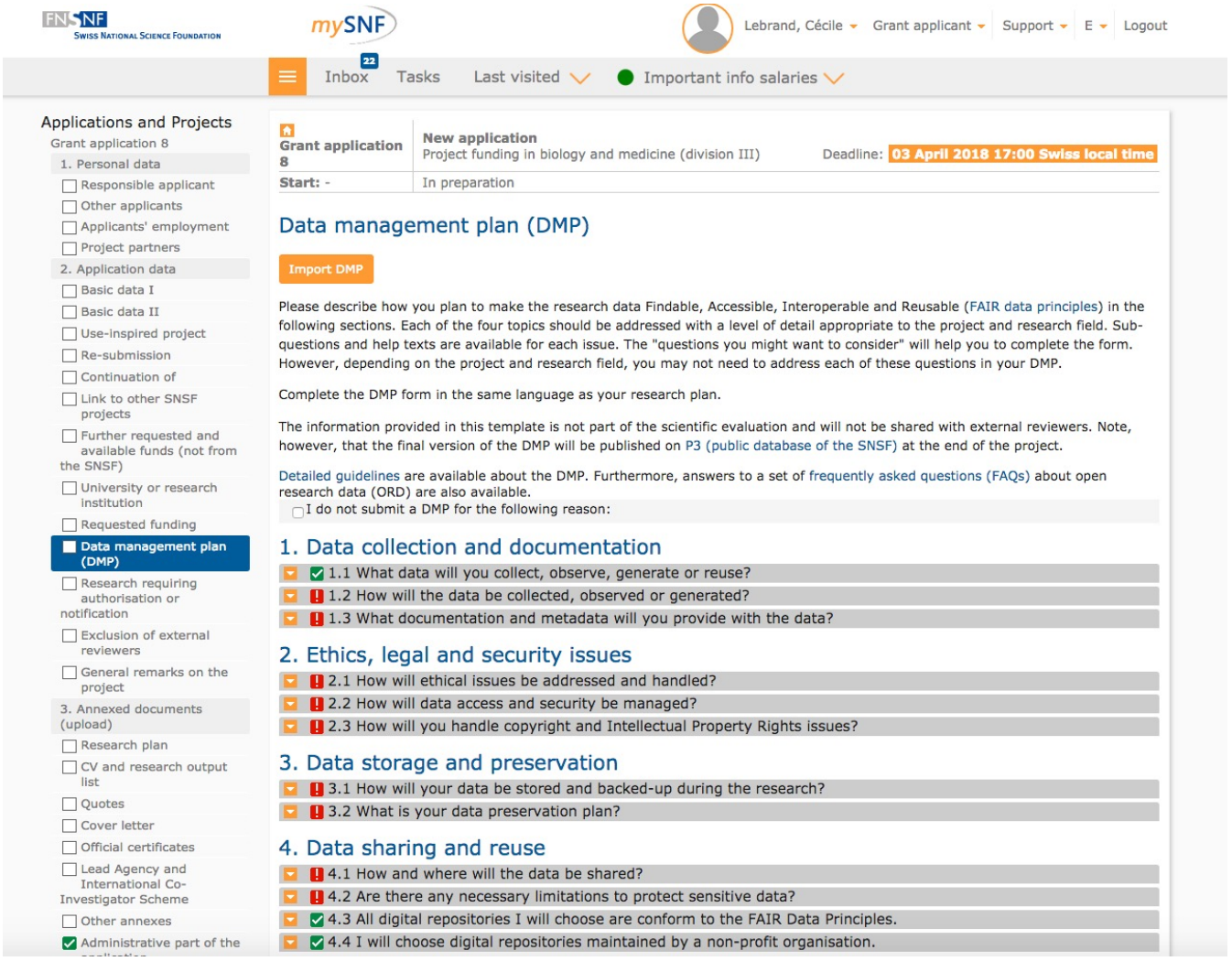
SNSF regulations

The regulations related to the SNSF policy on Open Research Data can be found in the Funding Regulations and in the General Implementation Regulations.
FR Art. 47 and IR Art. 2.13

Eligible Costs for SNSF grants

The costs of enabling access to research data that is collected, observed or generated under an SNSF grant are eligible if the research data is deposited in recognised scientific, digital data archives (data repositories) that meet the FAIR principles and do not serve any commercial purposes (IR 2.13). It is permissible to upload data to commercial repositories, but only the data preparation costs will be covered by the SNSF.

mySNF database



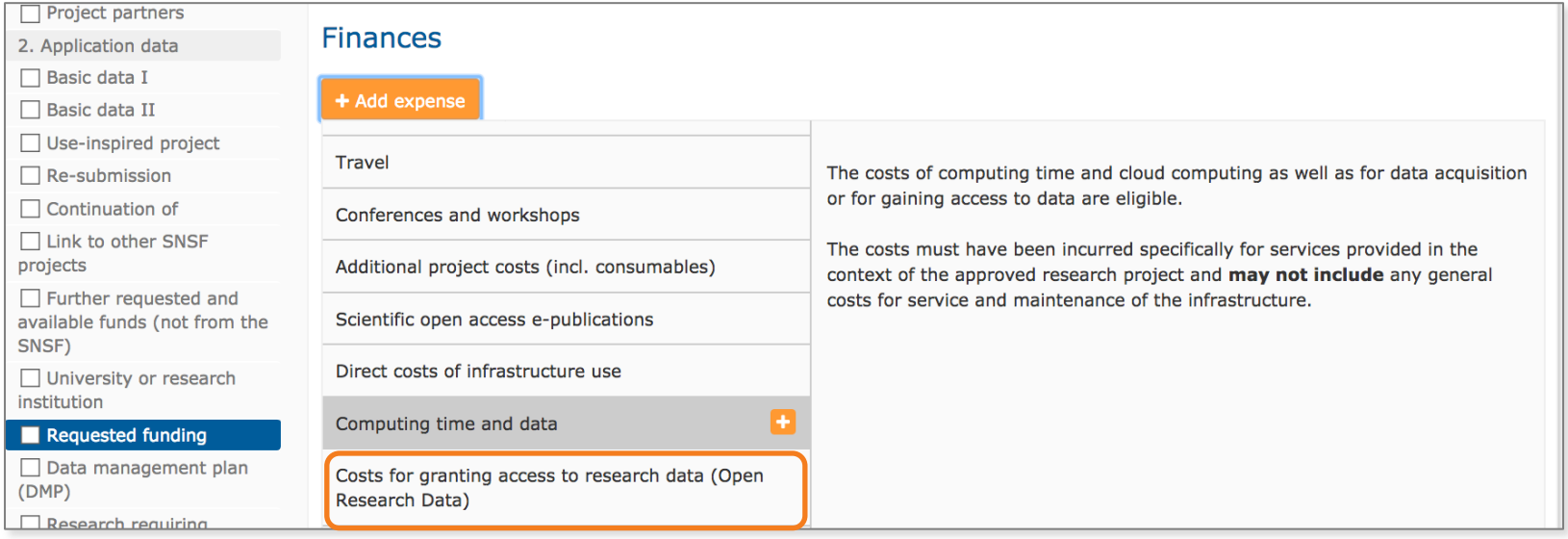
SNSF DMP – content of the mySNF form

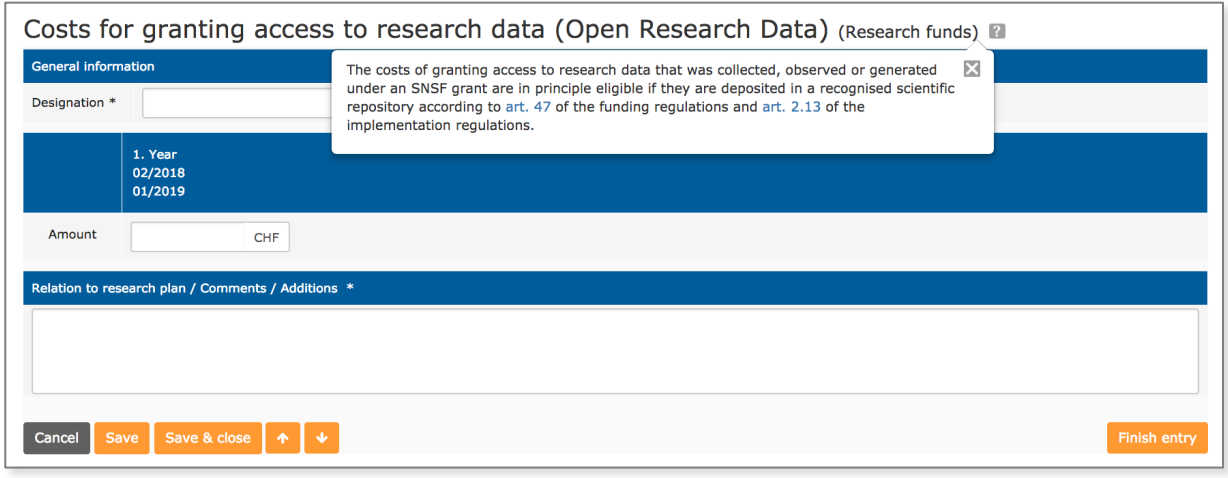
FNSNF
SWISS NATIONAL SCIENCE FOUNDATION

Data Management Plan – content of the mySNF form

	Question	Help text
1 Data collection and documentation		
	1.1 What data will you collect, observe, generate or re-use? Questions you might want to consider: - What type, format and volume of data will you collect, observe, generate or reuse? - Which existing data (yours or third-party) will you reuse?	Briefly describe the data you will collect, observe or generate. Also mention any existing data that will be (re)used. The descriptions should include the type, format and content of each dataset. Furthermore, provide an estimation of the volume of the generated data sets. (This relates to the *FAIR Data Principles* F2, I3, R1 & R1.2)
	1.2 How will the data be collected, observed or generated? Questions you might want to consider: - What standards, methodologies or quality assurance processes will you use? - How will you organize your files and handle versioning?	Explain how the data will be collected, observed or generated. Describe how you plan to control and document the consistency and quality of the collected data: calibration processes, repeated measurements, data recording standards, usage of controlled vocabularies, data entry validation, data peer review, etc. Discuss how the data management will be handled during the project, mentioning for example naming conventions, version control and folder structures. (This relates to the *FAIR Data Principle* R1)
	1.3 What documentation and metadata will you provide with the data? Questions you might want to consider: - What information is required for users (computer or human) to read and interpret the data in the future? - How will you generate this documentation? - What community standards (if any) will be used to annotate the (meta)data?	Describe all types of documentation (README files, metadata, etc.) you will provide to help secondary users to understand and reuse your data. Metadata should at least include basic details allowing other users (computer or human) to find the data. This includes at least a name and a persistent identifier for each file, the name of the person who collected or contributed to the data, the date of collection and the conditions to access the data. Furthermore, the documentation may include details on the methodology used, information about the performed processing and analytical steps, variable definitions, references to vocabularies used, as well as units of measurement. Wherever possible, the documentation should follow existing community standards and guidelines. Explain how you will prepare and share this information. (This relates to the *FAIR Data Principles* I1, I2, I3, R1, R1.2 & R1.3)

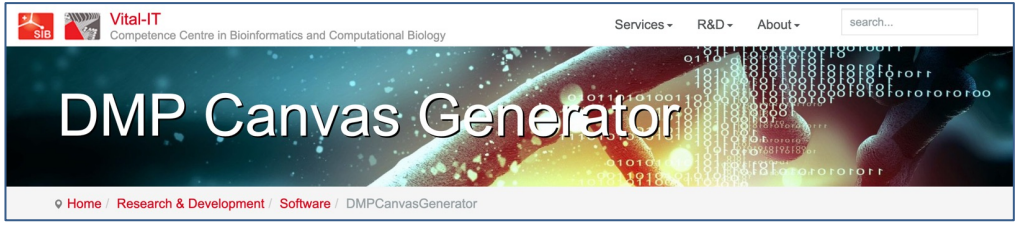
Eligible costs for SNSF grants





DMP tools and resources

Day 2



https://dmp.vital-it.ch/

DMPONLINE

https://dmp.unil.ch/

DMPONLINE

https://dmponline.dcc.ac.uk/

DSW

https://ds-wizard.org/

RDMkit

https://rdmkit.elixir-europe.org/

FAIRplus

https://fairplus-project.eu/

2. PLANNING PHASE

b. Ethical & Legal aspects

mySNF Data Management Plan (DMP)

1. Data collection and documentation

- 1.1 What data will you collect, observe, generate or reuse?
- 1.2 How will the data be collected, observed or generated?
- 1.3 What documentation and metadata will you provide with the data?

2. Ethics, legal and security issues

- 2.1 How will ethical issues be addressed and handled?
- 2.2 How will data access and security be managed?
- 2.3 How will you handle copyright and Intellectual Property Rights issues?

3. Data storage and preservation

- 3.1 How will your data be stored and backed-up during the research?
- 3.2 What is your data preservation plan?

4. Data sharing and reuse

- 4.1 How and where will the data be shared?
- 4.2 Are there any necessary limitations to protect sensitive data?
- 4.3 All digital repositories I will choose are conform to the FAIR Data Principles.
- 4.4 I will choose digital repositories maintained by a non-profit organisation.

Swiss National Science Foundation

2.1. How will ethical issues be addressed and handled?

Questions you might want to consider

- What is the relevant protection standard for your data? Are you bound by a confidentiality agreement?
- Do you have the necessary permission to obtain, process, preserve and share the data? Have the people whose data you are using been informed or did they give their consent?
- What methods will you use to ensure the protection of personal or other sensitive data?

SNSF says…

Ethical issues in research projects demand for an adaptation of research data management practices, e.g. how data is stored, who can access/reuse the data and how long the data is stored. Methods to manage ethical concerns may include: **anonymization of data; gain approval by ethics committees; formal consent agreements.** You should outline that all ethical issues in your project have been identified, including the corresponding measures in data management. (This relates to the *FAIR Data Principle* A1)

Poll 2: Ethical issues

What is the relevant protection standard for sharing your data?

Select the right answers

- ❑ Informed consent indicating that data are used for research purposes
- ❑ Provision for data sharing in the informed consent
- ❑ Approval by ethics committees
- ❑ Data pseudo-anonymization
- ❑ Data anonymization
- ❑ Ensure that there are no direct identifiers
- ❑ Ensure that there are no indirect identifiers
- ❑ Unlimited indirect identifiers
- ❑ Remove any nonessential identifying details
- ❑ Aggregate data if required
- ❑ Reduce the precision of a variable if required

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Information: Research on human subjects in Switzerland

Data concerning humans made publicly available must remain totally confidential and be anonymized at best. Researchers should include a provision for data sharing in the informed consent.

- Consult the *Commission cantonale d'éthique de la recherche sur l'être humain* before planning research, data use and data sharing.

- Comply with the general privacy protection law according to the *Federal Act on Data Protection* (Loi fédérale sur la protection des données, LPD).

- Adhere to the *Federal Act on Research involving Human Beings* (Loi relative à la recherche sur l'être humain, LRH) created to protect the dignity, privacy and health of human beings involved in research.

General consent for data sharing of sensitive human data

General consent for research allows you to decide whether or not you wish to :

- Make your clinical data and residual biological samples available for research.
- Contribute to the CHUV Genomic Biobank by donating a small amount of blood for genetic analysis for research purposes.
- Can be use by researchers for ORD

https://www.chuv.ch/fr/consentement-general/cg-home

Specific individual consent for data sharing of sensitive human data

Data privacy for sensitive information related to personal and private information will be handled carefully.

Indeed, we will divulgate and provide open-access to sensitive human data only after receiving explicit consent for publishing data openly of the individuals:

Proposition from CER-VD:
«Afin de promouvoir la recherche, les journaux et organismes de financement demandent parfois le partage des données utilisées pour les publications. Il est possible que vos données soient mises à disposition sur un site dédié pour l'utilisation par d'autres chercheurs et la validation des résultats publiés. Dans le cas d'un tel partage, vos données seront toujours codées de façon à ce qu'un utilisateur de ces données ne puisse pas remonter à votre identité. Vous devez être d'accord avec cela si vous participez à l'étude.»

canton de vaud
LIBERTÉ ET PATRIE
CER-VD
Commission cantonale d'éthique de la recherche sur l'être humain

https://www.cer-vd.ch/

Research on human subjects in Switzerland

Encoding/de-idenfication / anonymization of data; gain approval by ethics committees; formal consent agreements:

- Manage the above three title points according to your situation.
- Consult a specialized service for correct encoding/de-identification /anonymization of your data and ask funding agencies for cost coverage.

For research data sharing: If some data cannot be shared publicly because they are bound by legal, ethical or confidentiality criteria, you should explain their specific constraints.

Data Protection Impact Assessment (DPIA)

Process designed to identify risks arising out of the processing of personal data and to minimise these risks as far and as early as possible

Tool: hands-on guidance how to de-identify health-related data based on a subjective risk assessment approach done in accordance with Swiss law requirements.

- "Template de-identification use case evaluation and risk assessment"
- "Data de-identification - phased approach, Guidance for de-identification of health-related data in compliance with Swiss law requirements"

It is recommended to complete the assessment in the concept phase of the research project prior submission to the ethics committee.

https://sphn.ch/document/template-use-case-evaluation-and-risk-assessment/

Best Practices for Sharing Human Subjects Data

Dryad Requirement

- Ensure that there are no direct identifiers.
- Limit indirect identifiers. (Dryad allows a maximum of 3.)
- Remove any nonessential identifying details.
- Aggregate data – variables which may be potentially revealing, e.g., age, can be grouped.
- Reduce the precision of a variable – e.g., remove day and month from year of birth; use country instead of city; add or subtract a small, randomly chosen number.
- Restrict the upper or lower ranges of a continuous variable to hide outliers by collapsing them into a single code.
- Provide good documentation of your data in a README file.

https://datadryad.org/docs/HumanSubjectsData.pdf

Data sharing of sensitive human data

Take home message

- Ensure privacy protection through proper data anonymization.
- Ensure that shared data (used in conjunction with other publicly available data) do not contain information that allow the identification of an individual.

Be conscious that no perfect anonymization is feasible!!!!
Make sure to get the appropriate patient consent before starting your research on Human!!!!

Other sensitive data: animal or species sensitive research data

Permission and data management of animal data throughout the project

- Manage animal data in accordance with the « Ordonnance sur la protection des animaux, section 6. Documentation et statistique » (Art 143 Registre des animaux ; Art 144 Procès-verbaux de l'expérience).
- Form A and Form B on eTV (Swiss Federal electronical TierVersuch software)

For research data sharing

- In this case the project will not necessitate specific limitations on data sharing.
- Restriction in the case of endangered species data may apply (see dryad guidance).

https://www.blv.admin.ch/blv/en/home/tiere/tierversuche/antrag-bewilligung-tv.html

https://datadryad.org/docs/EndangeredSpeciesData.pdf

mySNF Data Management Plan (DMP)

1. Data collection and documentation

- 1.1 What data will you collect, observe, generate or reuse?
- 1.2 How will the data be collected, observed or generated?
- 1.3 What documentation and metadata will you provide with the data?

2. Ethics, legal and security issues

- 2.1 How will ethical issues be addressed and handled?
- 2.2 How will data access and security be managed?
- 2.3 How will you handle copyright and Intellectual Property Rights issues?

3. Data storage and preservation

- 3.1 How will your data be stored and backed-up during the research?
- 3.2 What is your data preservation plan?

4. Data sharing and reuse

- 4.1 How and where will the data be shared?
- 4.2 Are there any necessary limitations to protect sensitive data?
- 4.3 All digital repositories I will choose are conform to the FAIR Data Principles.
- 4.4 I will choose digital repositories maintained by a non-profit organisation.

Swiss National Science Foundation

2.3. How will you handle copyright and Intellectual Property Rights issues?

Questions you might want to consider

- Who will be the owner of the data?
- Which licenses will be applied to the data?
- What restrictions apply to the reuse of third-party data?

SNSF says...

Outline the owners of the copyright and Intellectual Property Right (IPR) of all data that will be collected and generated, including the licence(s). For consortia, an IPR ownership agreement might be necessary. You should comply with relevant funder, institutional, departmental or group policies on copyright or IPR. Furthermore, clarify what permissions are required should third-party data be re-used. (This relates to the FAIR Data Principles I3 & R1.1)

Poll 3: Copyright

Who will be the owner of the data?

Select the right answer

- ❑Your university
- ❑The PI
- ❑The collaborators
- ❑The SNSF

Join at:
vevox.app

ID:
193-360-850

Copyright and intellectual property for datasets

- In the European Union and USA, data collection involving creativity is copyrightable.
- The structural elements of a database involving originality is not explicitly covered by copyright in Switzerland (see code des obligations).
- Check your contract with your university (e.g: according to the UNIL-CHUV contract any data created or modified in the course of the professional activity by a UNIL collaborator belongs to the UNIL (except for copyrights belonging to the creator). For any use other than for scientific and academic purposes, the institution approval is necessary (eg for patenting and commercialization).

https://www.admin.ch/opc/fr/classified-compilation/19110009/201401010000/220.pdf

https://www.bium.ch/en/publication-open-access/data-management/#10

How will you handle copyright and Intellectual Property Rights issues?

Legal data agreement

- Collaboration agreement in the project (*Data agreement wizard*).
- Consortium Agreement (CA), Data Transfer and Use Agreement (DTUA) and Data Transfer and Processing Agreement (DTPA) of the Swiss Personalized Health Network (*SPHN*)

Open licenses for data

Promote sharing and unlimited use of the data that you produced using *explicit open licences*.

Restrictions applying to the reuse of third-party data?

If you cannot share some data because of commercial and patenting issues you should contact your technology transfer office at your University and explain the specific constraints.

https://www.bium.ch/en/publication-open-access/data-management/#10

3. ACTIVE PHASE

a. Collect, Process, Analyze

mySNF Data Management Plan (DMP)

1. Data collection and documentation

- [x] 1.1 What data will you collect, observe, generate or reuse?
- [x] 1.2 How will the data be collected, observed or generated?
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- [x] 2.1 How will ethical issues be addressed and handled?
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- [x] 3.1 How will your data be stored and backed-up during the research?
- [x] 3.2 What is your data preservation plan?

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- [x] 2.3 How will you handle copyright and Intellectual Property Rights issues?
- [x] 4.1 How and where will the data be shared?
- [x] 4.2 Are there any necessary limitations to protect sensitive data?
- [x] 4.3 All digital repositories I will choose are conform to the FAIR Data Principles.
- [x] 4.4 I will choose digital repositories maintained by a non-profit organisation.

1.1. What data will you collect, observer, generate, reuse?

Questions you might want to consider

- What type, format and volume of data will you collect, observe, generate or reuse?
- Which existing data (yours or third-party) will you reuse?

SNSF says…

Briefly describe the data you will collect, observe or generate. Also mention any existing data that will be (re)used. The descriptions should include the type, format and content of each dataset. Furthermore, provide an estimation of the volume of the generated data sets. (This relates to the *FAIR Data Principles* F2, I3, R1 & R1.2)

Type, format and volume of data

Typical data used in a research project

- Raw data
- Protocols
- Codes/scripts/programs
- Processed data
- Results
- Notes/notebooks

Type, format and volume of data

Types

- State: raw versus analysed data, qualitative vs quantitative
- Nature: (un)structured text, spreadsheet, image, video, audio, database, map, etc…
- Mode of collection: experimental, observational

Type, format and volume of data

Files format

Appropriate file format crucial to access and reuse your data.

- Open file formats: used by anyone (file specifications publicly available).
- Proprietary file formats: only with software provided by the vendor.

Prefer open file formats to share or archive data, they are commonly used and less prone to obsolescence

https://www.bium.ch/en/publication-open-access/data-management/#5

Type, format and volume of data

Data format (examples)

- Cell microscopy images (TIFF)
- Sequencing data (FASTQ)
- Scripts (.sh, .r, .py)
- MS data (mzXML, PKL*)
- Interview videos (MP4)
- Texts accompanying videos (PDF)

** Proprietary format*
(https://en.wikipedia.org/wiki/Mass_spectrometry_data_format)

Type, format and volume of data

Scale

- Estimate the volume during the planning phase.
- Volume will influence on the costs (storage and backup).
- Which data to keep for long-term preservation (archive)?

Type, format and volume of data

Data reuse

Consider re-using existing data from earlier projects

- Avoid unnecessary experiments
- Make research more robust by aggregating results

Provenance

- From your group
- From another group (what permission?)

Example

Data generated will be in various types, formats and sizes of datasets, all of which will be accessible using common software allowing easy access and long-term validity during and after the project, thus facilitating data sharing. The format/types of data include:

i) Cell images e.g. phase and fluorescence, and electron micrographs (~5,000 images over project). Software used includes OpenLab, Softworx and IN Cell Investigator, with data saved as software-specific files e.g liff and lg3 files, as well as generic formats such as jpeg, tiff etc.

ii) Mass spectrometry spectra (from <50 samples). MS data will be analysed using Bruker Data Analysis or Thermo Excalibur software (generating xml and raw files) and proteins will be matched to the T. brucei genome dataset using the Matrix Science Mascot search engine. Each LC-MS data file is between 1-2GB.

Source: DCC Example DMPs and guidance

Example

To ease the process, list in a table: type of experiment, types of data, equipment, software, file formats and volume

Types	Equipment	Software	Data storage format	Data archiving / sharing format	Volume
Microscopy images					
Raw data: microscopy cell images	Zeiss LSM 710 Quasar	ZEN lite software	.liff	.tiff uncompressed, JPEG2000	500 GB
Secondary data: 3D Z-stack reconstructions and processed images		Imaris 7.2.1 software; Fiji/ImageJ; Adobe Photoshop CS5	.ims, .tif series, .PSD	.tiff uncompressed, JPEG2000	1 TB
Analysed data: cell quantifications		Imaris 7.2.1 software, Excel	.ims, .xlsx	.xlsx; .csv	3 GB
Raw data :time lapse video microscopy	Leica SP5	LAS AF Lite 4.0.11706	.czi files;.avi,.mov	MPEG-4; Motion JPEG 2000	500 GB
Analysed data: tracking function		Metamorph software 6.0	.xlsx	.xlsx; .csv	2 GB
Western Blots					
Raw data: cell images					1 GB
Analysed data: quantification					500 MB
					TOTAL =

Bium recommended File formats for long-term preservation and re-use

Dryad recommended formats if you plan to publish your data on this Data repository

Hands-on
Data collection table

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Swiss National Science Foundation

1.2. How will the data be collected, observed or generated?

Questions you might want to consider

- What standards, methodologies or quality assurance processes will you use?
- How will you organize your files and handle versioning?

SNSF says...

Explain how the data will be collected, observed or generated. Describe how you plan to control and document the consistency and quality of the collected data: calibration processes, repeated measurements, data recording standards, usage of controlled vocabularies, data entry validation, data peer review, etc. Discuss how the data management will be handled during the project, mentioning for example naming conventions, version control and folder structures. (This relates to the *FAIR Data Principle* R1)

> Experimental records that aren't being digitized account for 17% loss of all research data

T. H. Vines et al, Cell Current Biology 2014

Data management software

Will you use animal or human samples?

For Humans...

secuTrial®
web-based data capture in clinical trials

Soarian®
Clinicals
Cerner

REDCap
Research Electronic Data Capture

...and Animals

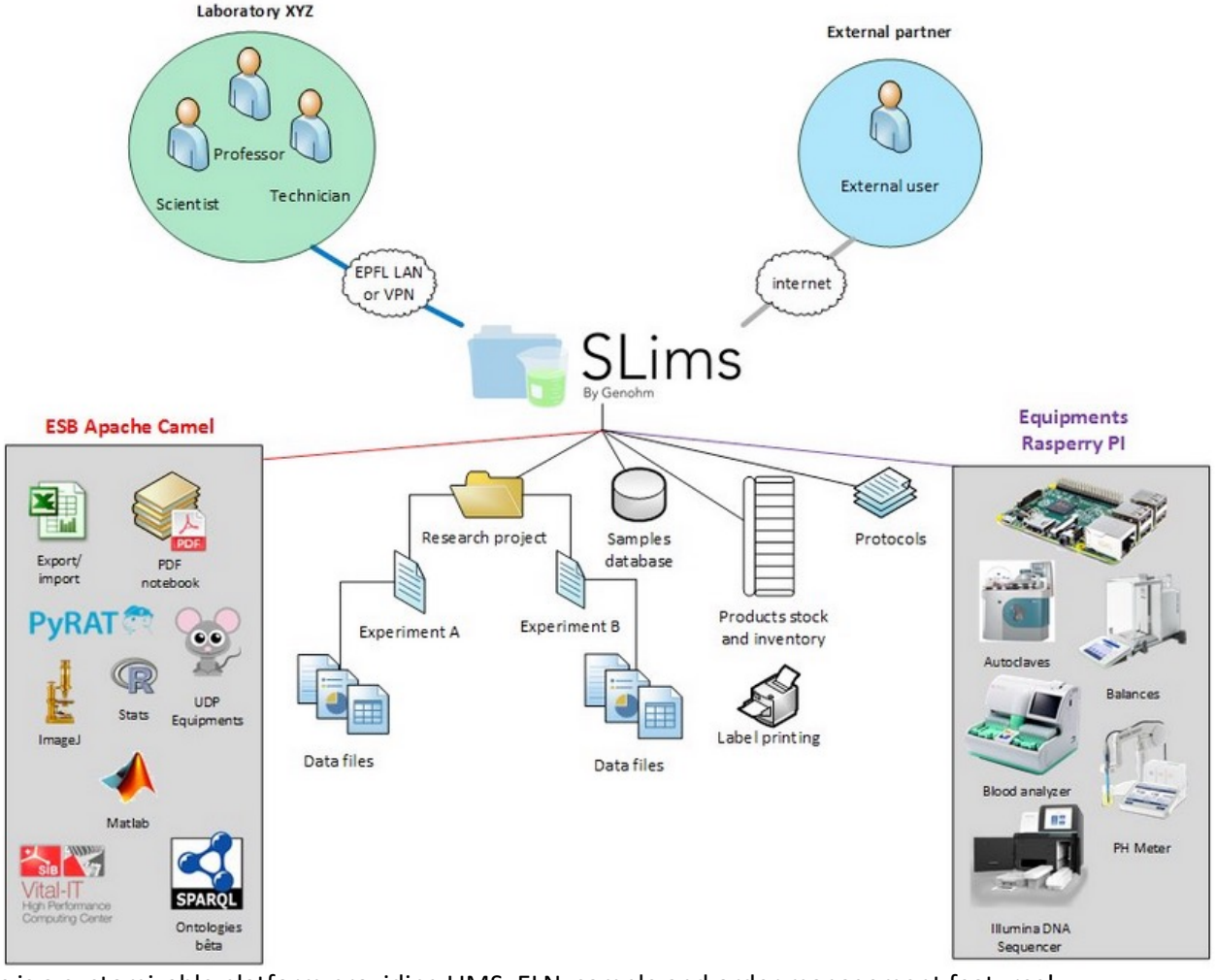
PyRAT
animal facility software

Electronic Laboratory Notebooks (ELN)

SCINOTE	Benchling	labarchives Chance Favors the Organized Lab
User friendly ***	User friendly **	User friendly *
Easy set-up and use	Easy set-up and use	Complicated to use
Open source (MPL)	Open source (MIT)	Not open source
Unlimited project users	Single project user ?	Single project user
Free 10GB storage	Free 2GB storage	Free 25MB storage
Workflow visualization	Molecular biology suite	GraphPad Prism interface

Protocols sharing

Laboratory Information Management System (LIMS)

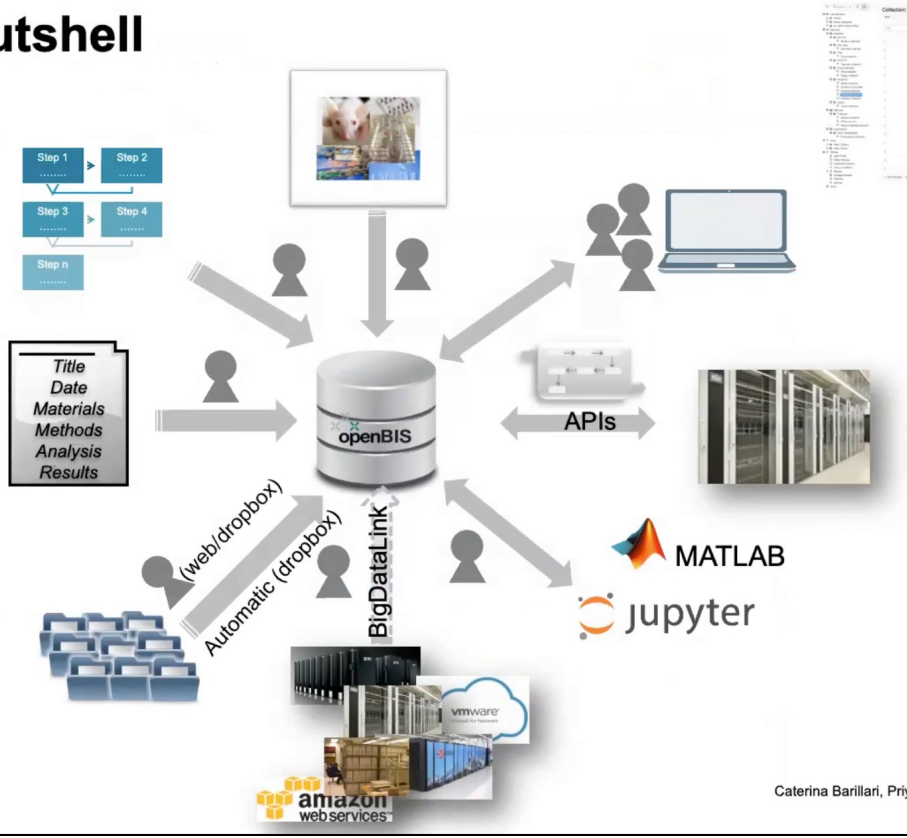


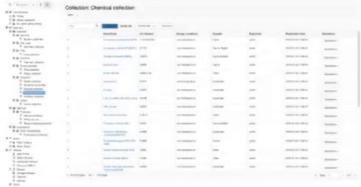
SLims is a customizable platform providing LIMS, ELN, sample and order management features!

Laboratory Information Management System (LIMS)

ETH zürich

openBIS in a nutshell





https://openbis.ch/

Data entry validation

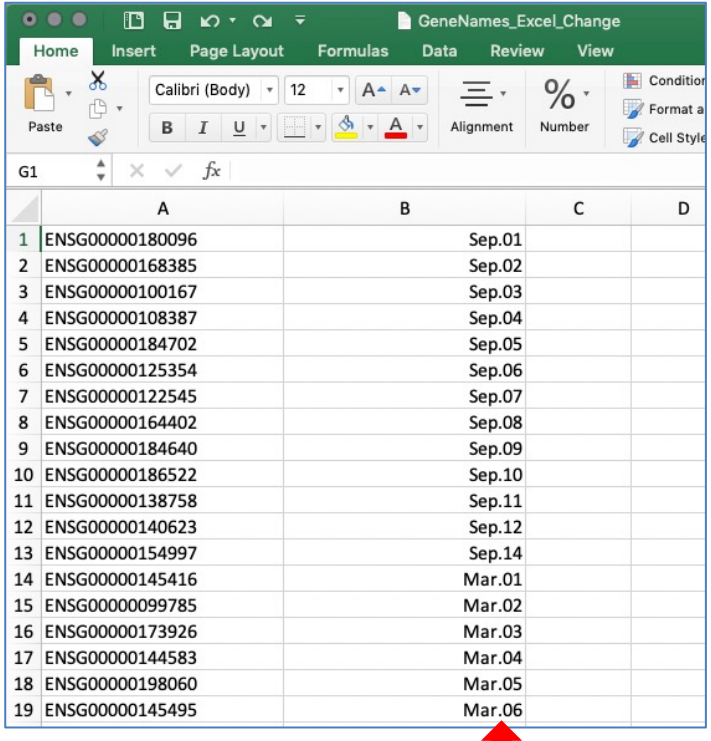
Text file

GeneNames_Excel_Change.txt — Edited

ENSG00000180096	SEPT1
ENSG00000168385	SEPT2
ENSG00000100167	SEPT3
ENSG00000108387	SEPT4
ENSG00000184702	SEPT5
ENSG00000125354	SEPT6
ENSG00000122545	SEPT7
ENSG00000164402	SEPT8
ENSG00000184640	SEPT9
ENSG00000186522	SEPT10
ENSG00000138758	SEPT11
ENSG00000140623	SEPT12
ENSG00000154997	SEPT14
ENSG00000145416	MARCH1
ENSG00000099785	MARCH2
ENSG00000173926	MARCH3
ENSG00000144583	MARCH4
ENSG00000198060	MARCH5
ENSG00000145495	MARCH6
ENSG00000136536	MARCH7
ENSG00000165406	MARCH8
ENSG00000139266	MARCH9
ENSG00000173838	MARCH10
ENSG00000183654	MARCH11
ENSG00000173077	DEC1

Gene names

Imported into Excel

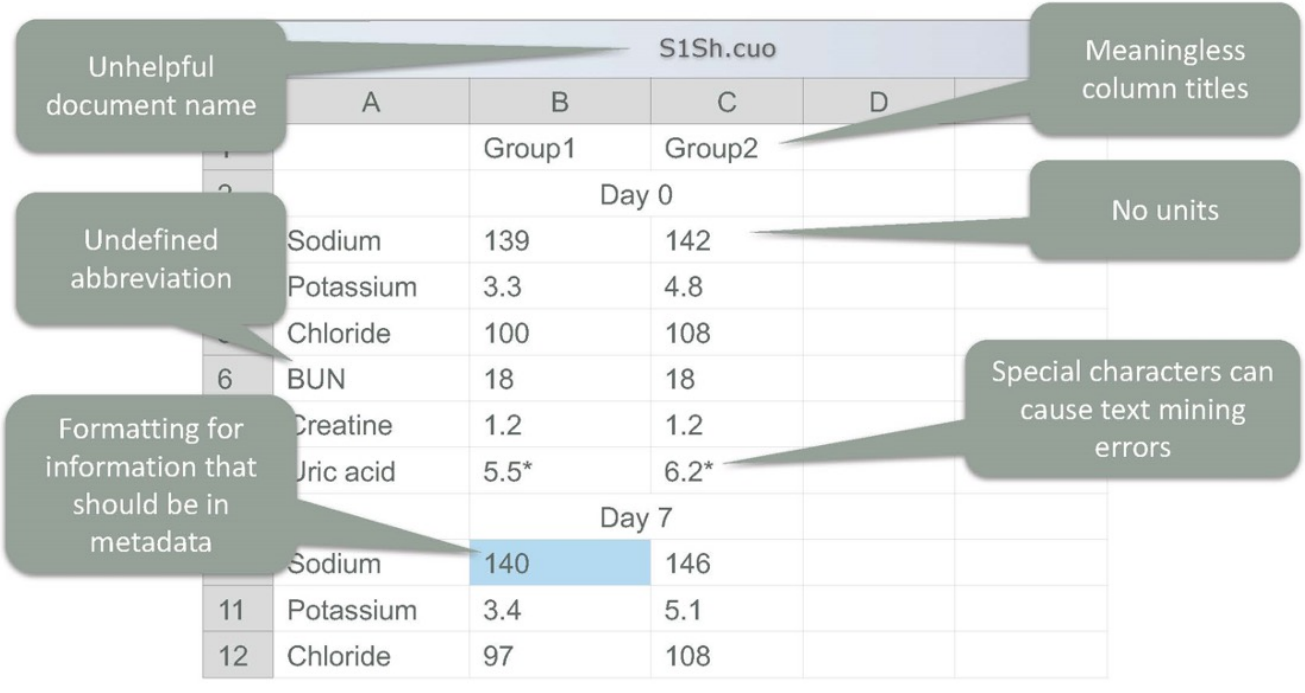


	A	B	C	D
1	ENSG00000180096	Sep.01		
2	ENSG00000168385	Sep.02		
3	ENSG00000100167	Sep.03		
4	ENSG00000108387	Sep.04		
5	ENSG00000184702	Sep.05		
6	ENSG00000125354	Sep.06		
7	ENSG00000122545	Sep.07		
8	ENSG00000164402	Sep.08		
9	ENSG00000184640	Sep.09		
10	ENSG00000186522	Sep.10		
11	ENSG00000138758	Sep.11		
12	ENSG00000140623	Sep.12		
13	ENSG00000154997	Sep.14		
14	ENSG00000145416	Mar.01		
15	ENSG00000099785	Mar.02		
16	ENSG00000173926	Mar.03		
17	ENSG00000144583	Mar.04		
18	ENSG00000198060	Mar.05		
19	ENSG00000145495	Mar.06		

Dates!

Poor data layout

Poor data layout



S1Sh.cuo

	A	B	C	D
		Group1	Group2	
		Day 0		
	Sodium	139	142	
	Potassium	3.3	4.8	
	Chloride	100	108	
6	BUN	18	18	
	Creatine	1.2	1.2	
	Uric acid	5.5*	6.2*	
		Day 7		
	Sodium	140	146	
11	Potassium	3.4	5.1	
12	Chloride	97	108	

Improved data layout

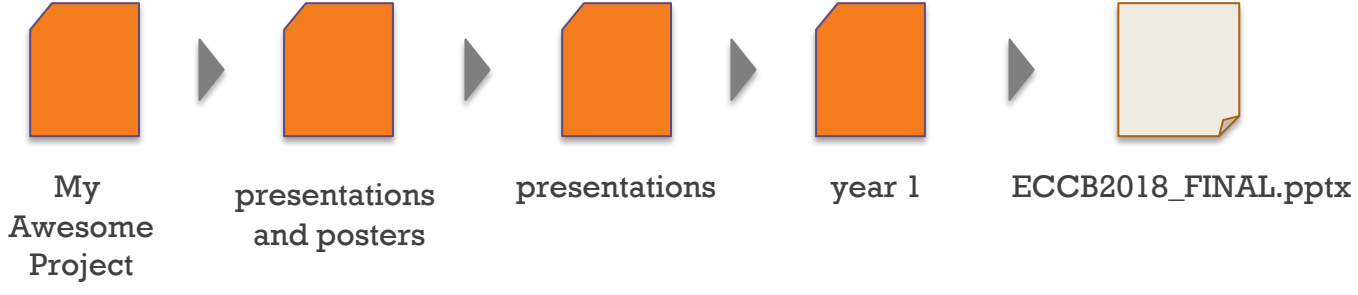
Table-2_blood-population-1.csv

Parameter	Day	Control	Treatment	Units	P value
Potassium	0	55	120	mg/l	0.8
NaCl	0	3.8	3	mg/l	0.7
Zinc	0	4	8	mg/l	0.84
Uric acid	0	12	20	mg/l	0.88
Potassium	2	123	99	mg/l	0.75
NaCl	2	5	2.8	mg/l	0.77
Zinc	2	6	14	mg/l	0.8
Uric acid	2	12	15	mg/l	0.74

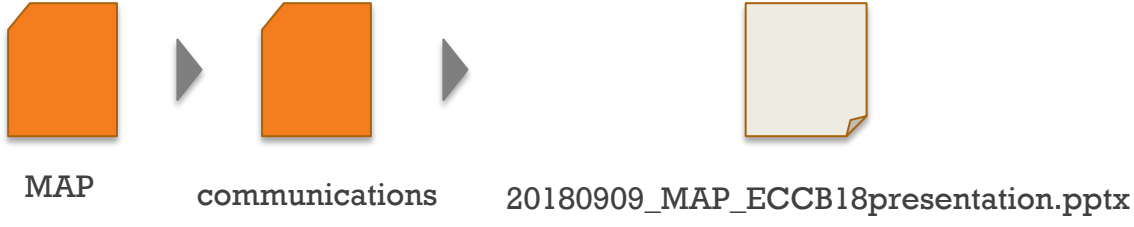
Data organization – folders structure

Create directory hierarchy in advance

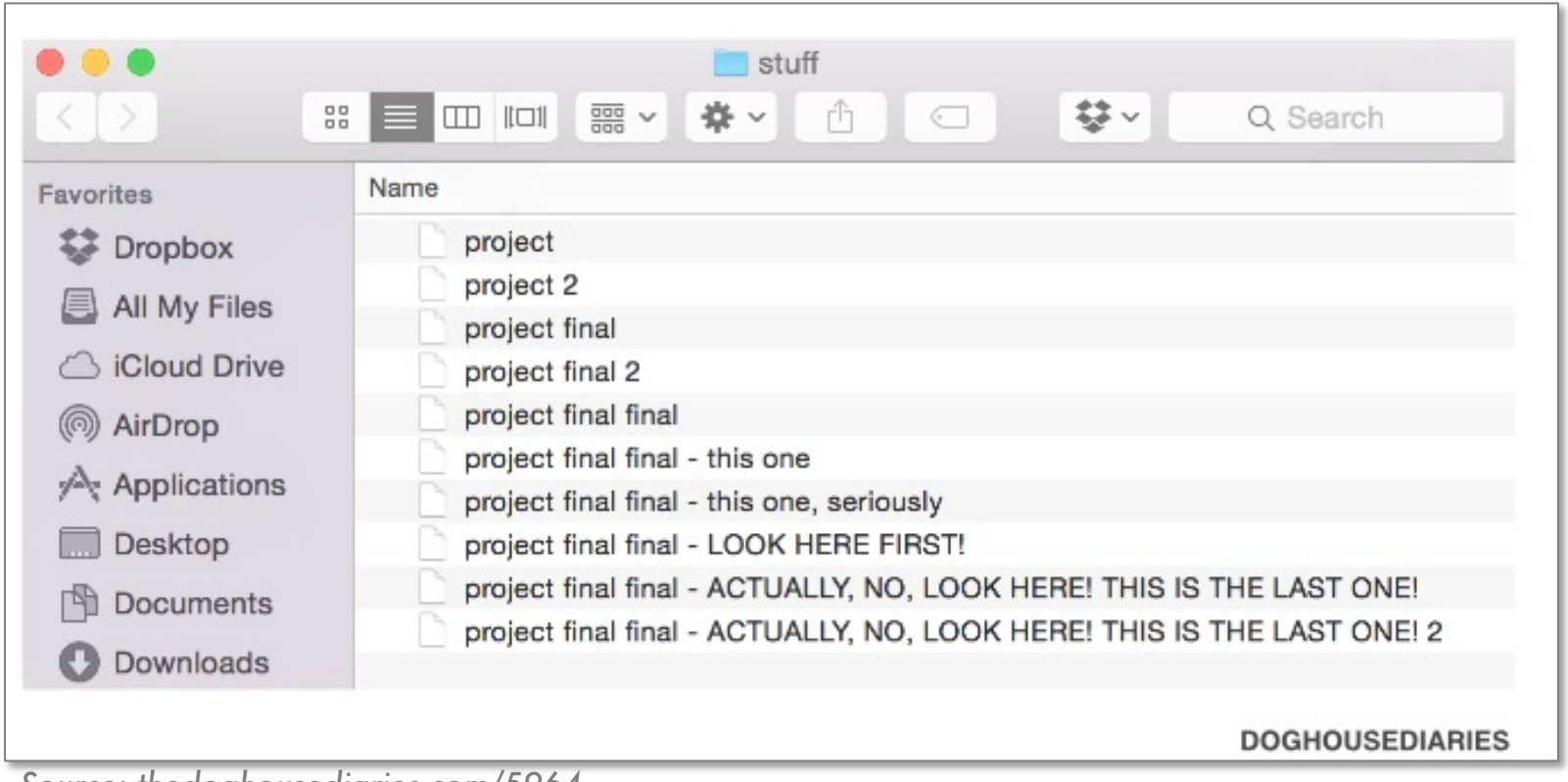
...and make it as simple as possible



Data organization – folders structure



Data organization – file naming



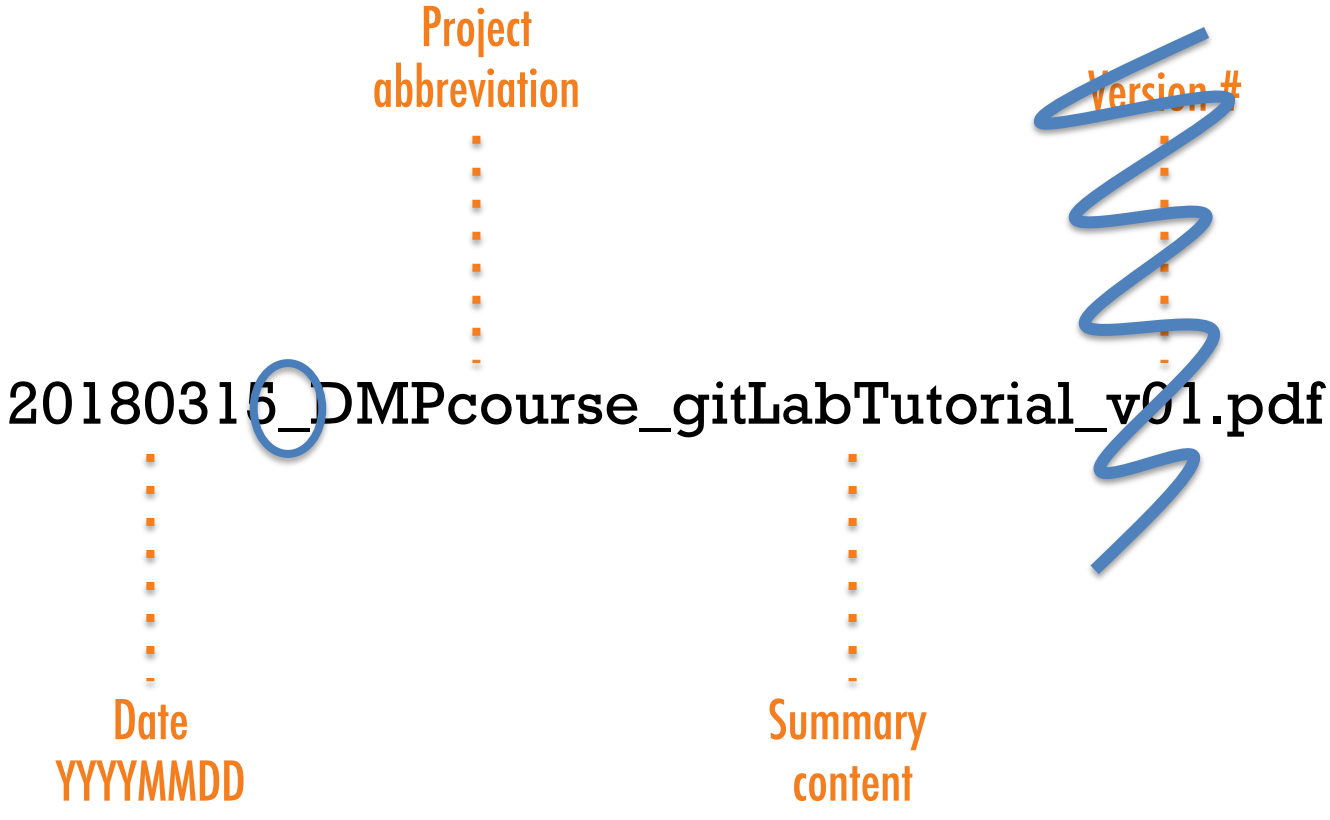
Source: thedoghousediaries.com/5964

Data organization – file naming

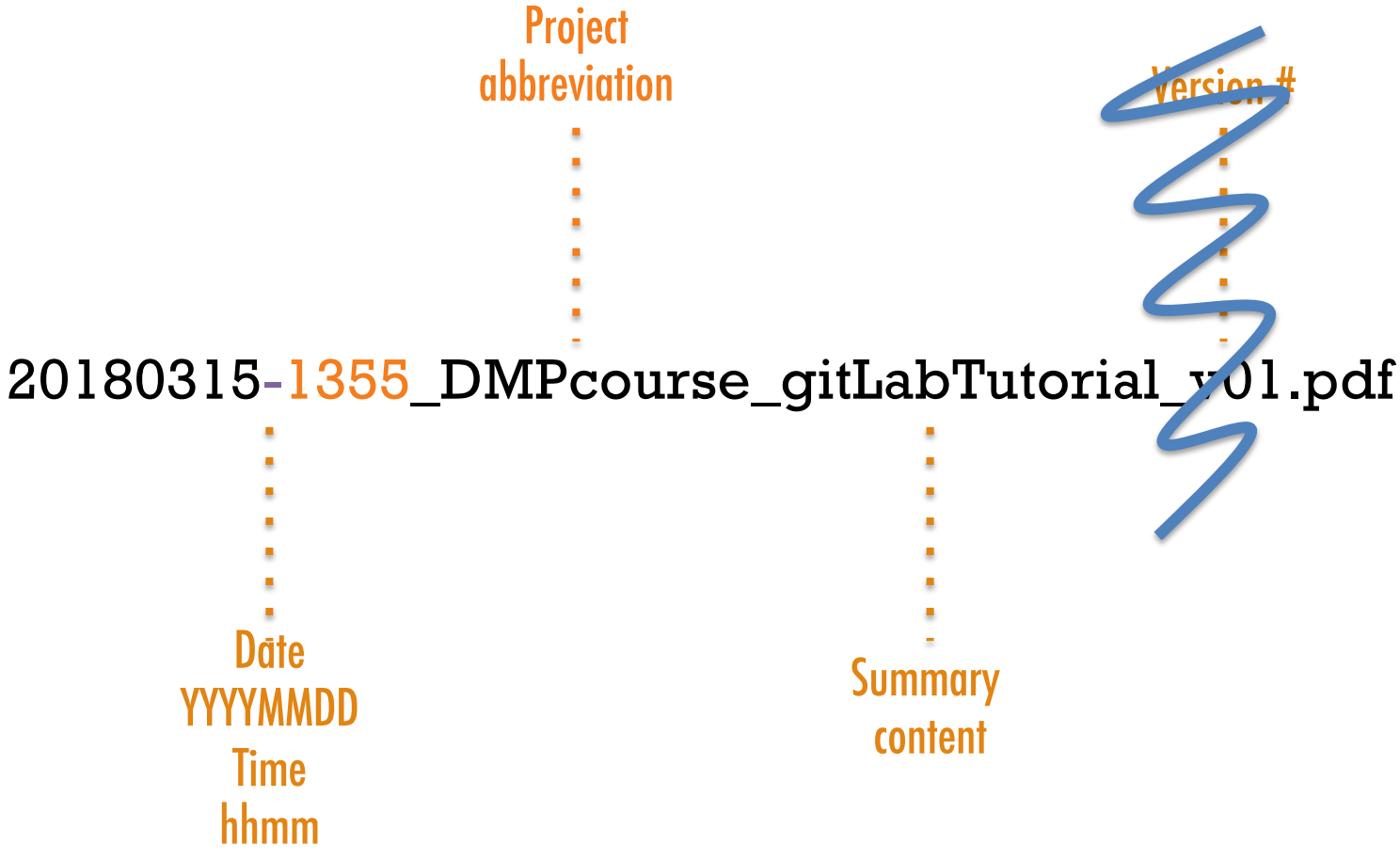
Rule of thumb in file naming

- Keep filenames short, but meaningful
- Do not use spaces
- Avoid special characters ?!+%&#()<>${}*
- Use - _ or capital letters toDelimitWords
- Include numbers in at least two-digit format , i.e. 01-99
- For dates use this format: YYYYMMDD

Data organization – file naming



Data organization – file naming



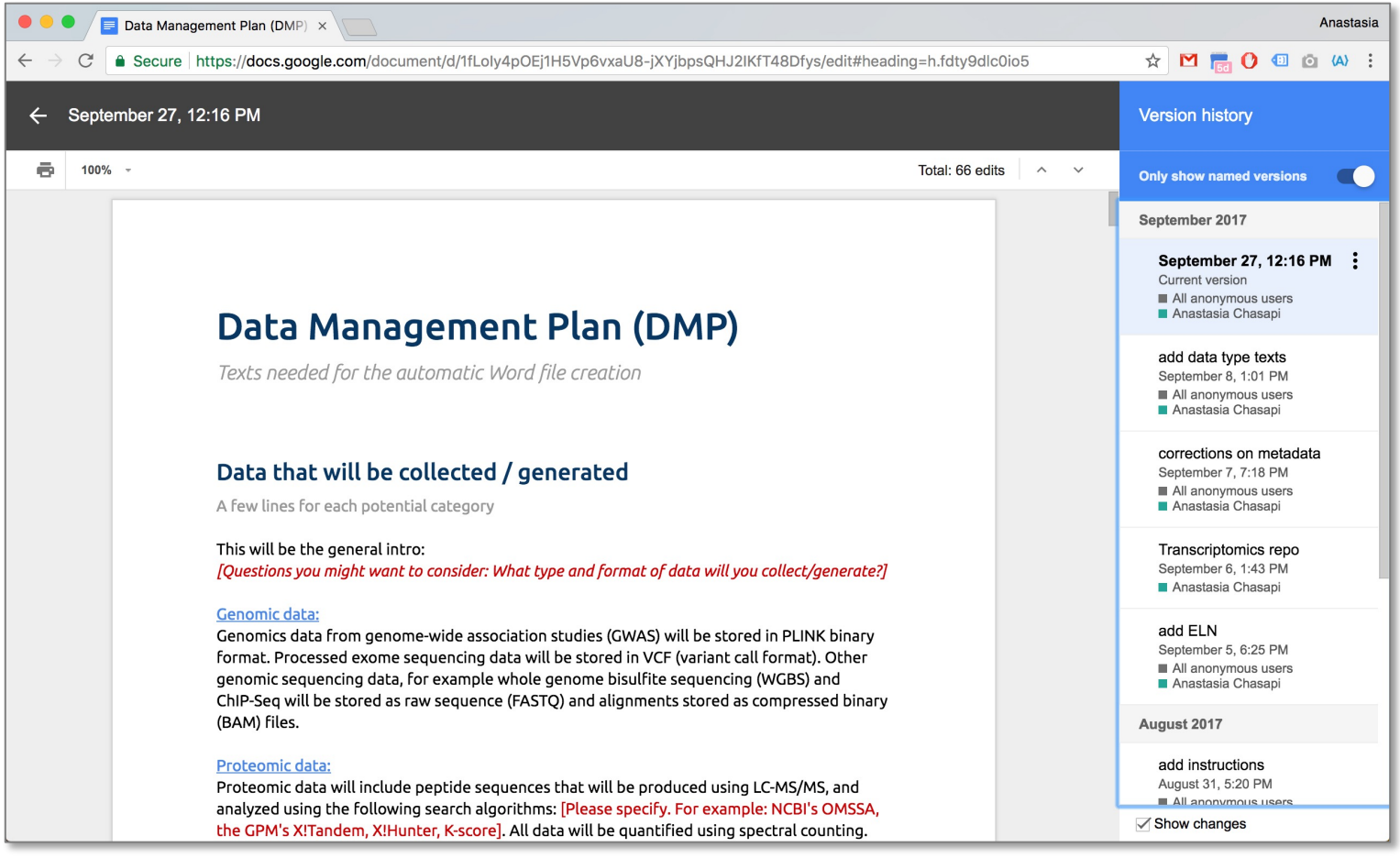
Version control

Use Version Control systems to keep track of all modifications done during the project lifetime

Version control of your documents

Real-time collaborative tools

Version control of your documents



Version control of your documents

Google Terms of Service

Rights

This license allows Google to:

- host, reproduce, distribute, communicate, and use your content — for example, to save your content on our systems and make it accessible from anywhere you go
- publish, publicly perform, or publicly display your content, if you've made it visible to others
- modify your content, such as reformatting or translating it
- sublicense these rights to:
  - other users to allow the services to work as designed, such as enabling you to share photos with people you choose
  - our contractors who've signed agreements with us that are consistent with these terms, only for the limited purposes described in the Purpose section below

Where is your data stored?

Locally?

On servers in Switzerland?

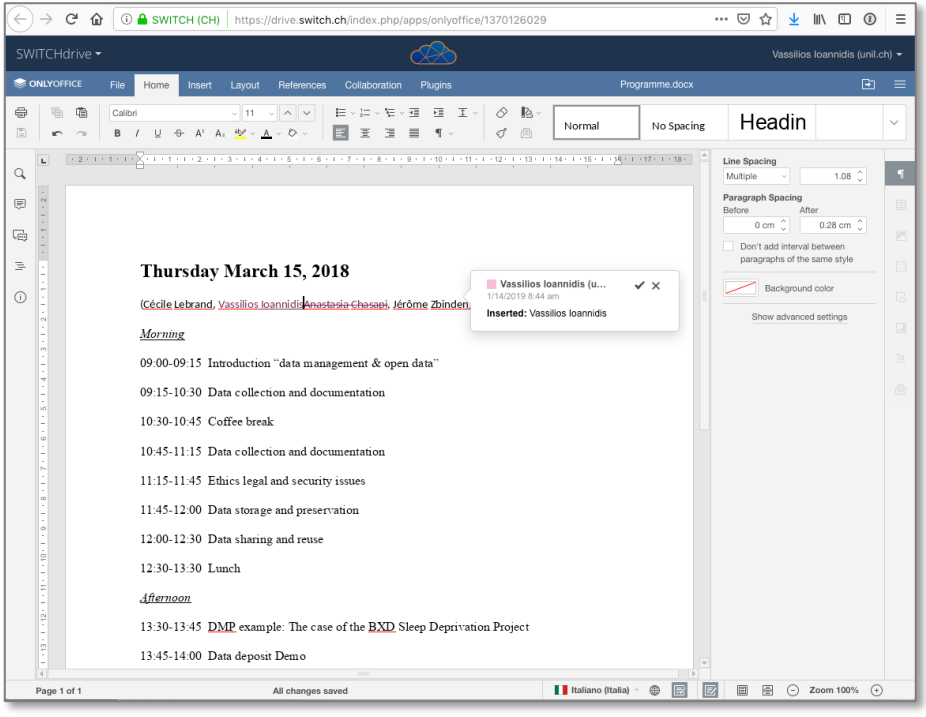
On servers elsewhere?

Check with your institution for clinical data!

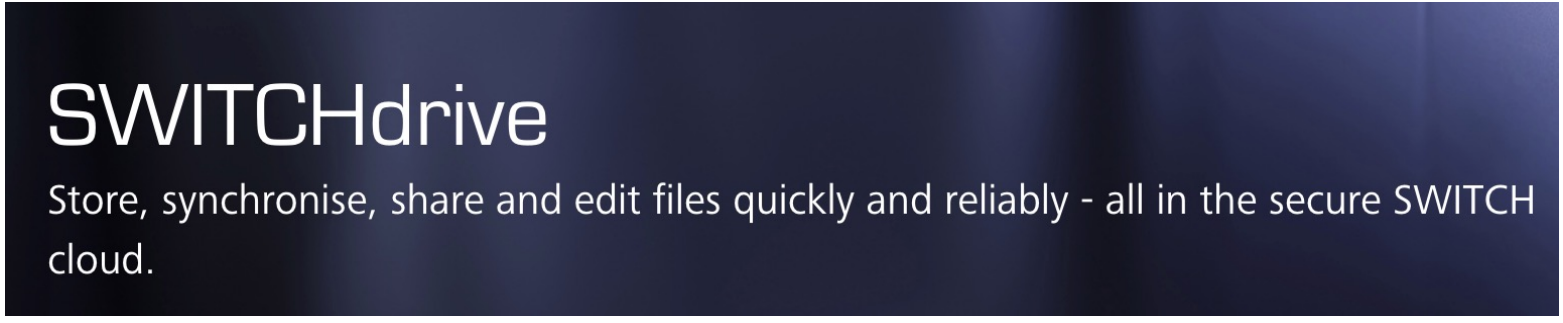
SWITCH collaborative tools - OnlyOffice

OnlyOffice integration allows many collaboration functions

- Real-time collaboration on shared documents - work with others on a document and track all changes live
- No local software installation required
- Access via desktop client, browser or mobile application



SWITCH collaborative tools - SWITCHdrive

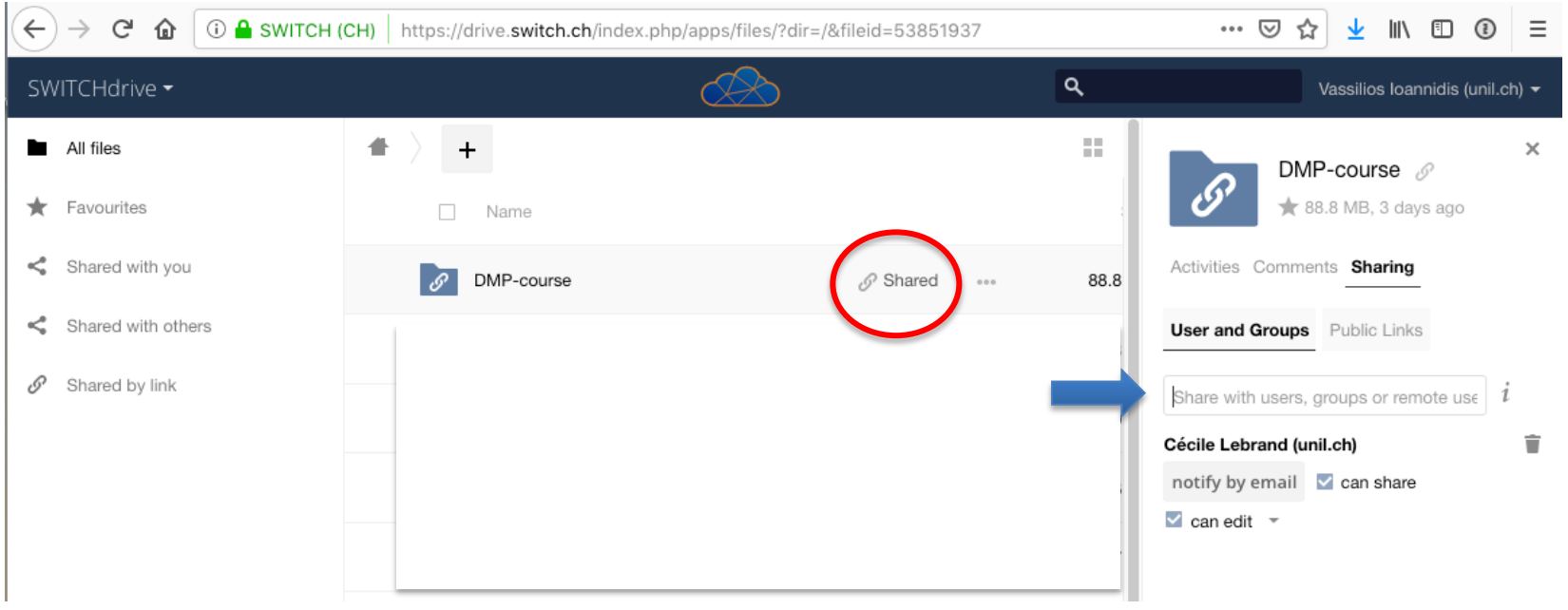


Services at a glance

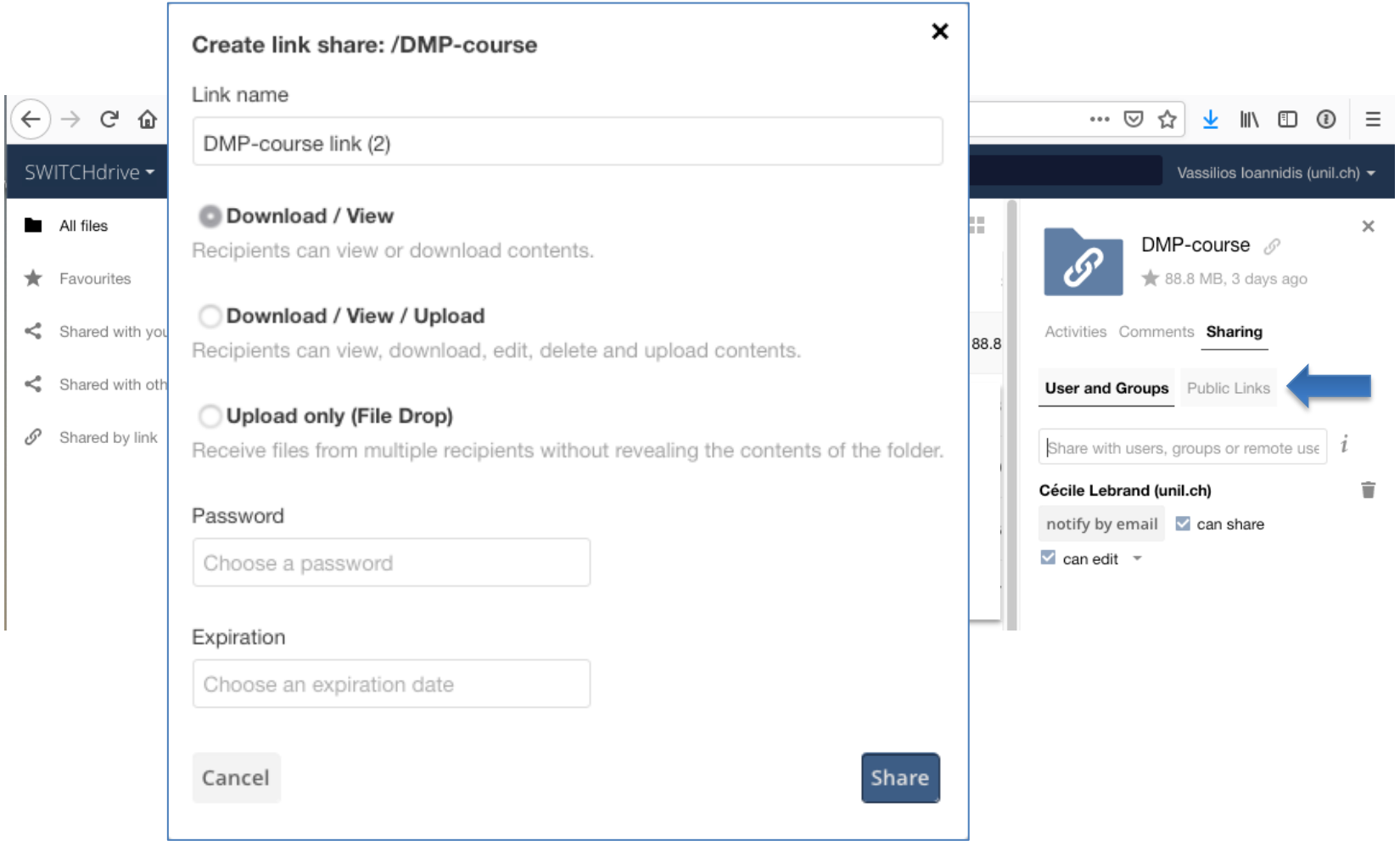
- 100 GB of storage space per user
- Online file storage
- Synchronisation of file across several devices
- File sharing and collaboration
- Access via desktop client, browser or mobile app
- SWITCH cloud service

https://www.switch.ch/drive/

SWITCH collaborative tools – sharing (internal)



SWITCH collaborative tools – sharing (external)

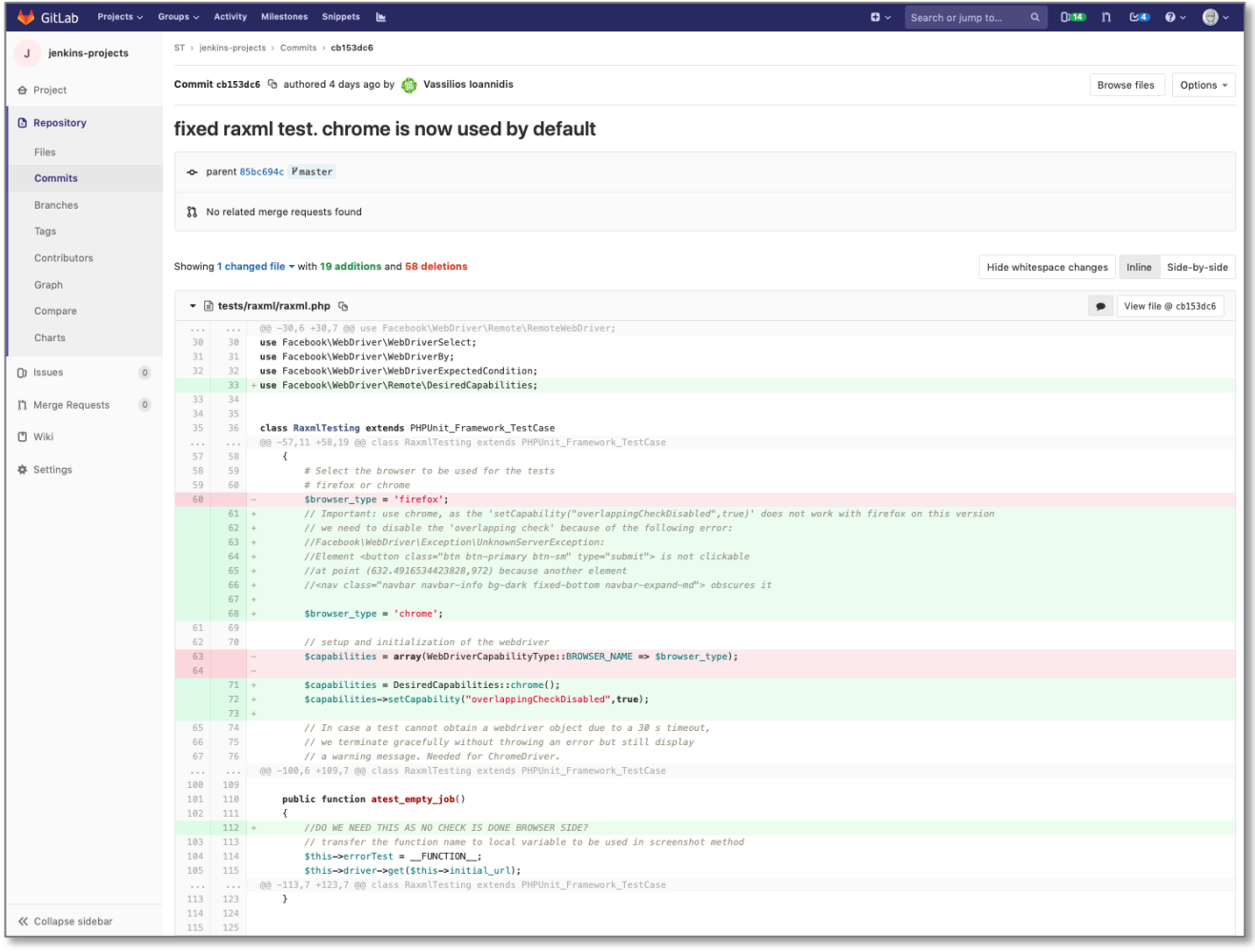


Version control of your code

• • •

Next SIB Git course: *Version Control with Git*, 2-4.10.2023

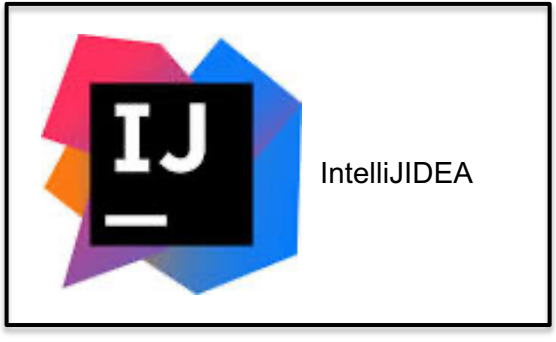
Version control of your code



Version control of your code

For the command line haters out there…

Visual Studio Code



Version control – dynamic report generation

R Markdown Notebook

(Demo)

- Open Rstudio
- Create a new project
- Create a new MarkDown file – MS Word
- Use the given template and ‘Knitr’

Version control – dynamic report generation

Jupyter

R Markdown Notebook

Knitr

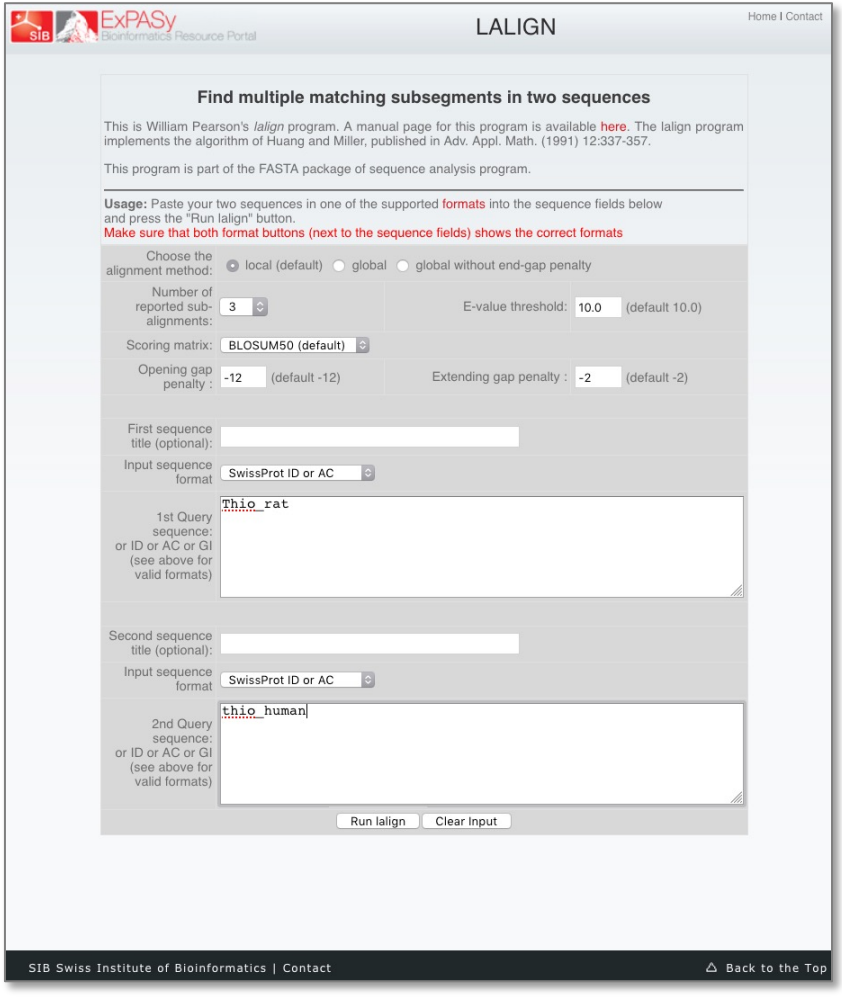
MATLAB Live Editor

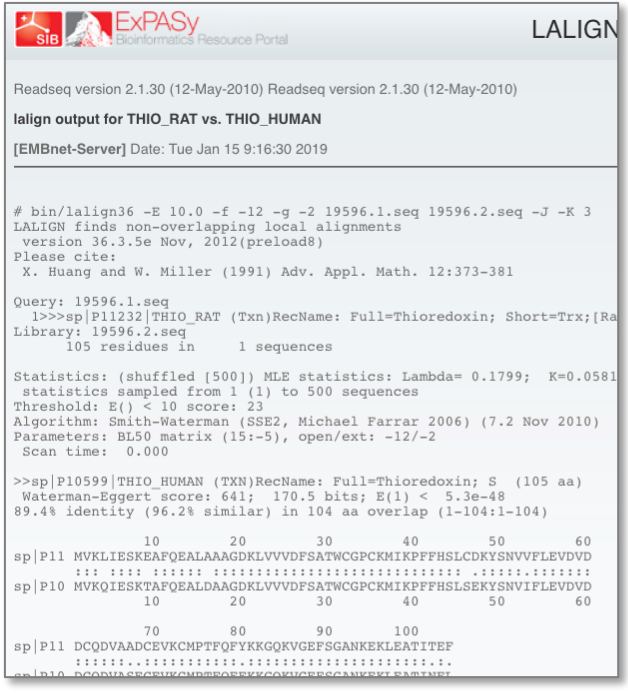
Version control

General advice for reproducible research:

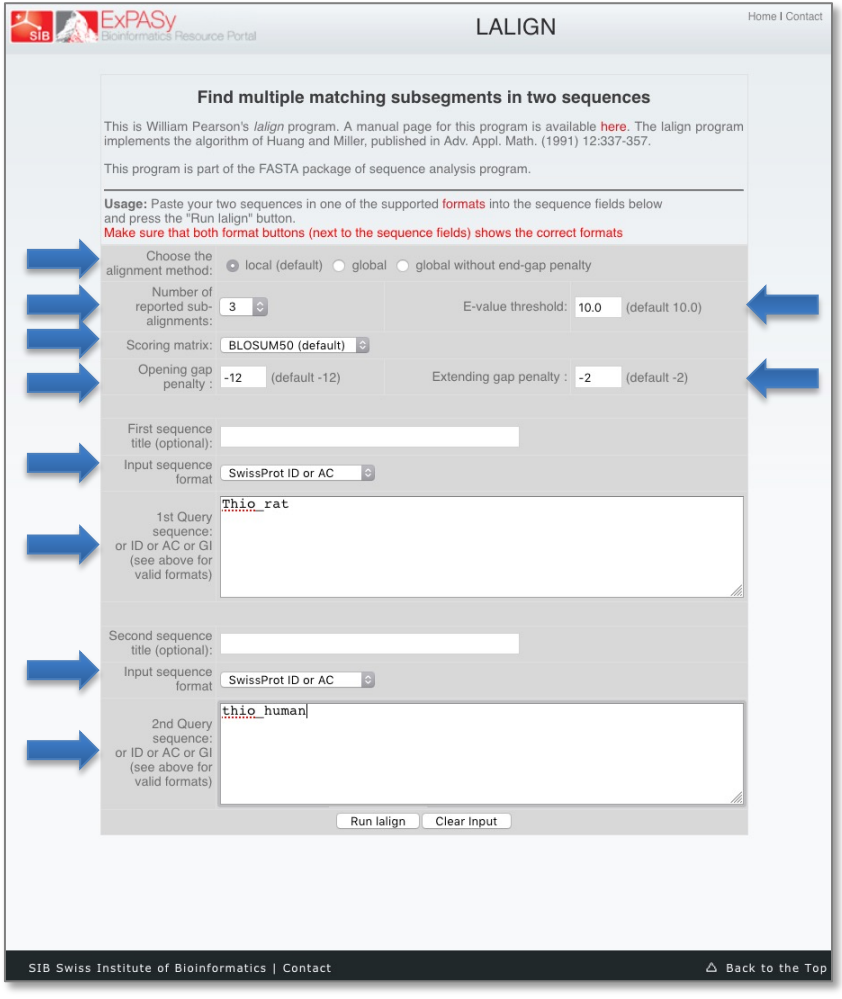
- *Don't do things by hand*
- *Don't point and click*
- *Document software environment*

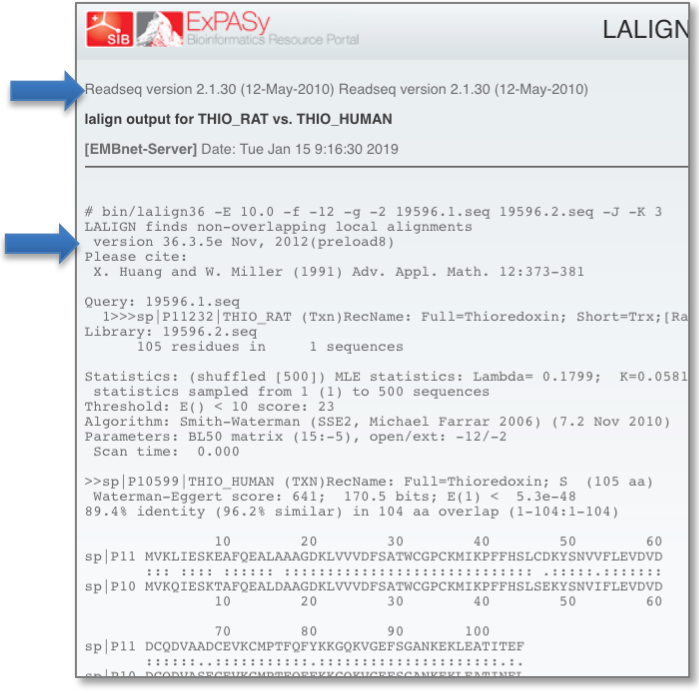
Version control with GUI programs





Version control with GUI programs





3. ACTIVE PHASE

b. Data Documentation & Metadata

mySNF Data Management Plan (DMP)

1. Data collection and documentation

- 1.1 What data will you collect, observe, generate or reuse?
- 1.2 How will the data be collected, observed or generated?
- 1.3 What documentation and metadata will you provide with the data?

2. Ethics, legal and security issues

- 2.1 How will ethical issues be addressed and handled?
- 2.2 How will data access and security be managed?
- 2.3 How will you handle copyright and Intellectual Property Rights issues?

3. Data storage and preservation

- 3.1 How will your data be stored and backed-up during the research?
- 3.2 What is your data preservation plan?

4. Data sharing and reuse

- 4.1 How and where will the data be shared?
- 4.2 Are there any necessary limitations to protect sensitive data?
- 4.3 All digital repositories I will choose are conform to the FAIR Data Principles.
- 4.4 I will choose digital repositories maintained by a non-profit organisation.

Swiss National Science Foundation

1.3. What documentation and metadata will you provide with the data?

Questions you might want to consider

- What information is required for users (computer or human) to read and interpret the data in the future?
- How will you generate this documentation?
- What community standards (if any) will be used to annotate the (meta)data

SNSF says…

Describe all types of documentation (README files, metadata, etc.) you will provide to help secondary users to understand and reuse your data. Metadata should at least include basic details allowing other users (computer or human) to find the data. This includes at least a name and a persistent identifier for each file, the name of the person who collected or contributed to the data, the date of collection and the conditions to access the data. Furthermore, the documentation may include details on the methodology used, information about the performed processing and analytical steps, variable definitions, references to vocabularies used, as well as units of measurement. Wherever possible, the documentation should follow existing community standards and guidelines. Explain how you will prepare and share this information. (This relates to the *FAIR Data Principles* I1, I2, I3, R1, R1.2 & R1.3)

Documentation for Research Data at various levels

Project level

what the study set out to do, how it contributes new knowledge to the field, what the research questions/hypotheses were, what methodologies were used, what sampling frames were used, what instruments and measures were used, etc.

File or database level

how all the files (or tables in a database) that make up the dataset relate to each other; what format they are in; whether they supercede or are superceded by previous files. A readme.txt file is the classic way of accounting for all the files and folders in a project.

Variable or item level

the key to understanding research results is knowing exactly how an object of analysis came about. Not just, for example, a variable name at the top of a spreadsheet file, but the full label explaining the meaning of that variable in terms of how it was operationalised.

Recommendations from « Documentation, metadata, citation" tutoriel en ligne, Mantra.

Documentation to provide with the data

Examples

- laboratory notebooks & experimental protocols
- questionnaires, codebooks, data dictionaries
- software syntax and output files
- information about equipment settings & instrument calibration
- database schema
- methodology reports
- provenance information about sources of derived or digitised data

Recommendations from « Documentation, metadata, citation" tutoriel en ligne, Mantra.

What does metadata mean?

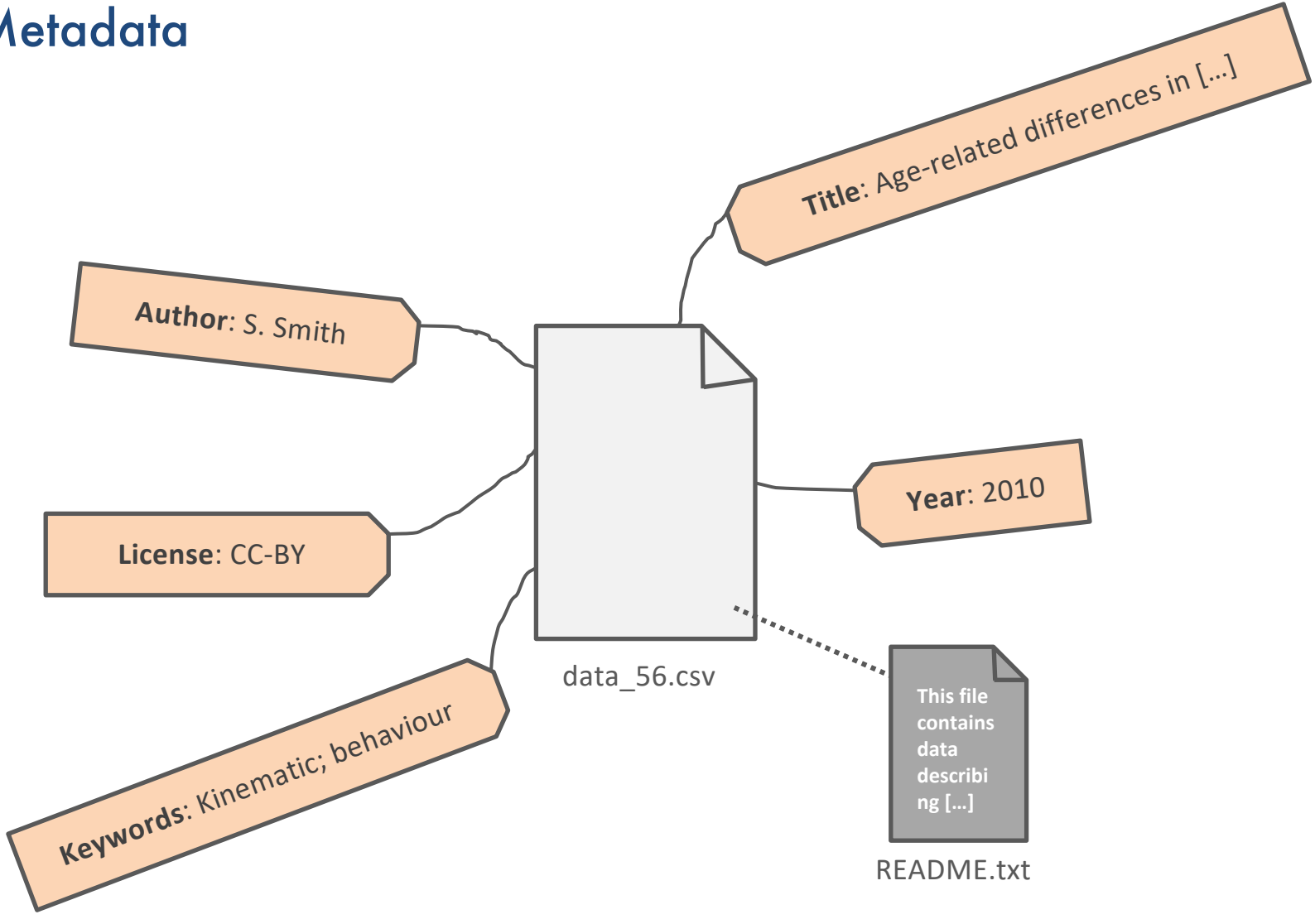
- The term metadata is commonly defined as "data about data", information that describes or contextualises the data.
- The difference between documentation and metadata is that the first is meant to be read by humans and the second implies computer-processing (though metadata may also be human-readable).
- Documentation is sometimes considered a form of metadata, because it is information about data, and when it is very structured it can be. The importance of metadata lies in the potential for machine-to-machine interoperability, providing the user with added functionality, or 'actionable' information.

Recommendations from « Documentation, metadata, citation" tutoriel en ligne, Mantra.

Sample DataCite XML (HTML tags)

<resource xmlns="http://datacite.org/schema/kernel-2.1" xmlns:xsi="http://www.w3.org/2001/meta/ker
<identifier identifierType="DOI">**10.1594/WDCC/CCSRNIES_SRES_B2**</identifier>
<creators>
<creator><creatorName>**Toru, Nozawa**</creatorName></creator>
<creator><creatorName>**Utor, Awazon**</creatorName>
<nameIdentifier nameIdentifierScheme="ISNI">1422 4586 3573 0476</nameIdentifier></creator
</creators>
<titles>
<title>**National Institute for Environmental Studies and Center for Climate System Research Japan**</title
<title titleType="Subtitle">A survey</title>
</titles>
<publisher>**World Data Center for Climate (WDCC)**</publisher>
<publicationYear>**2004**</publicationYear>
<subjects>
<subject>**Earth sciences and geology**</subject>
<subject subjectScheme="DDC">551 Geology, hydrology, meteorology</subject>
</subjects>
<contributors>
<contributor contributorType="DataManager">
<contributorName>PANGAEA</contributorName>
</contributor>
<contributor contributorType="ContactPerson »>

Metadata


Title: Age-related differences in [...]
Author: S. Smith
Year: 2010
License: CC-BY
Keywords: Kinematic; behaviour
data_56.csv
This file contains data describi ng [...]
README.txt

Poll 3: Metadata

What metadata would you need to describe a dataset in your field?

Select the 3 answers that best correspond to your situation

- ❑ Identifier (DOI), Creator, Title
- ❑ Publisher, Publication Year
- ❑ Resource Type
- ❑ Subject, description
- ❑ Contributor
- ❑ Related Identifier
- ❑ Geolocation
- ❑ Funding Reference
- ❑ Data size, Format, Version
- ❑ Rights (licenses)

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nature

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WORLD VIEW | 05 September 2022

Without appropriate metadata, data-sharing mandates are pointless

Funders and investigators must demand appropriate metadata standards to take data from foul to FAIR.

Mark A. Musen

https://www.nature.com/articles/d41586-022-02820-7

Know the relevant standards in your community

- Many communities have developed specific guidelines for reporting certain kinds of data
- Check journal guidelines to see what is required.
- Can help you format your data in a useful manner

biosharing (https://biosharing.org)

- Browse information on over 600 reporting standards
- Find standards that are relevant to your type of data

nature research

https://fairsharing.org/standards/

DCC

Because good research needs good data

About

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Events

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Guidance

Briefing Papers

How-to Guides

Case Studies

Policy Analysis

Metadata

Disciplinary Metadata

Curation Lifecycle Model

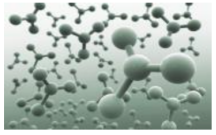
Data Management Plans

Research

Publications

Search by Discipline

Social Science & Humanities



Physical Science

General Research Data

Earth Science

Biology

Search by Resource Type

Metadata Standards

Specifications for the minimum information that should be collected about research data in order for it to be re-used.

Profiles and Extensions

Standards that have been adapted for use in particular types of repositories, or for particular types of data.

Use cases

Institutional repositories and data portals using standards to determine which metadata should be collected upon data deposit.

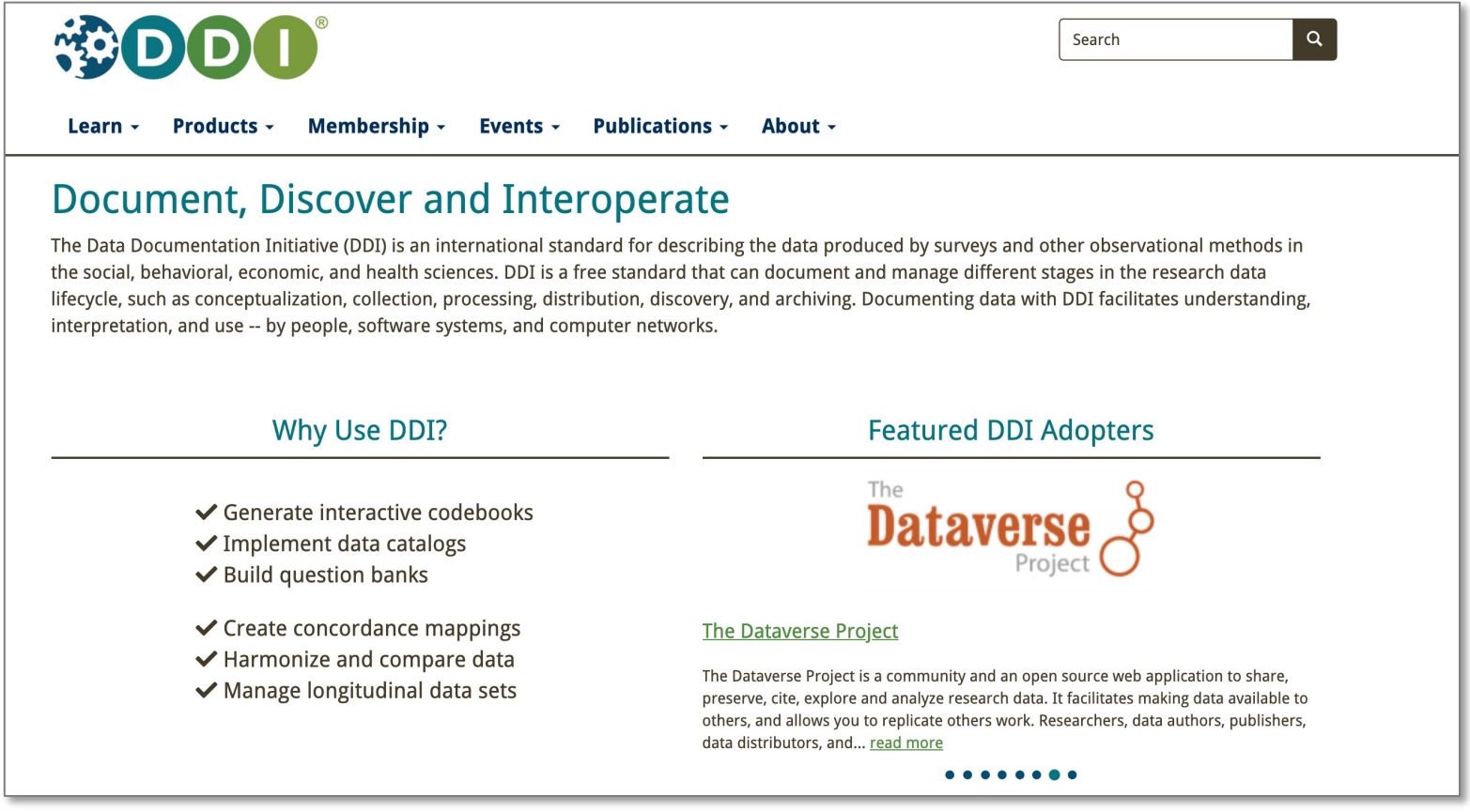
Tools

Software that has been developed to capture or store metadata conforming to a specific standard.

https://www.dcc.ac.uk/guidance/standards/metadata

Data Documentation Initiative (DDI)

International standard for describing the data produced by surveys and other observational methods in the social, behavioral, economic, and health sciences.



https://ddialliance.org/

DataCite Metada Schema

Allow any king of data to be understood and reused by other members of the research group and add contextual value to the datasets for future publishing and data sharing.

Mandatory	Recommended	Optional
Identifier	Subject	Language
Creator	Contributor	Alt. Identifier
Title	Date	Size
Publisher	Related Identifier	Format
Publication Year	Description	Version
Resource Type	Geolocation	Rights
	FundingReference	

BiUM Metadata standards information

Readme file

Help ensure that your data can be correctly interpreted and reanalyzed

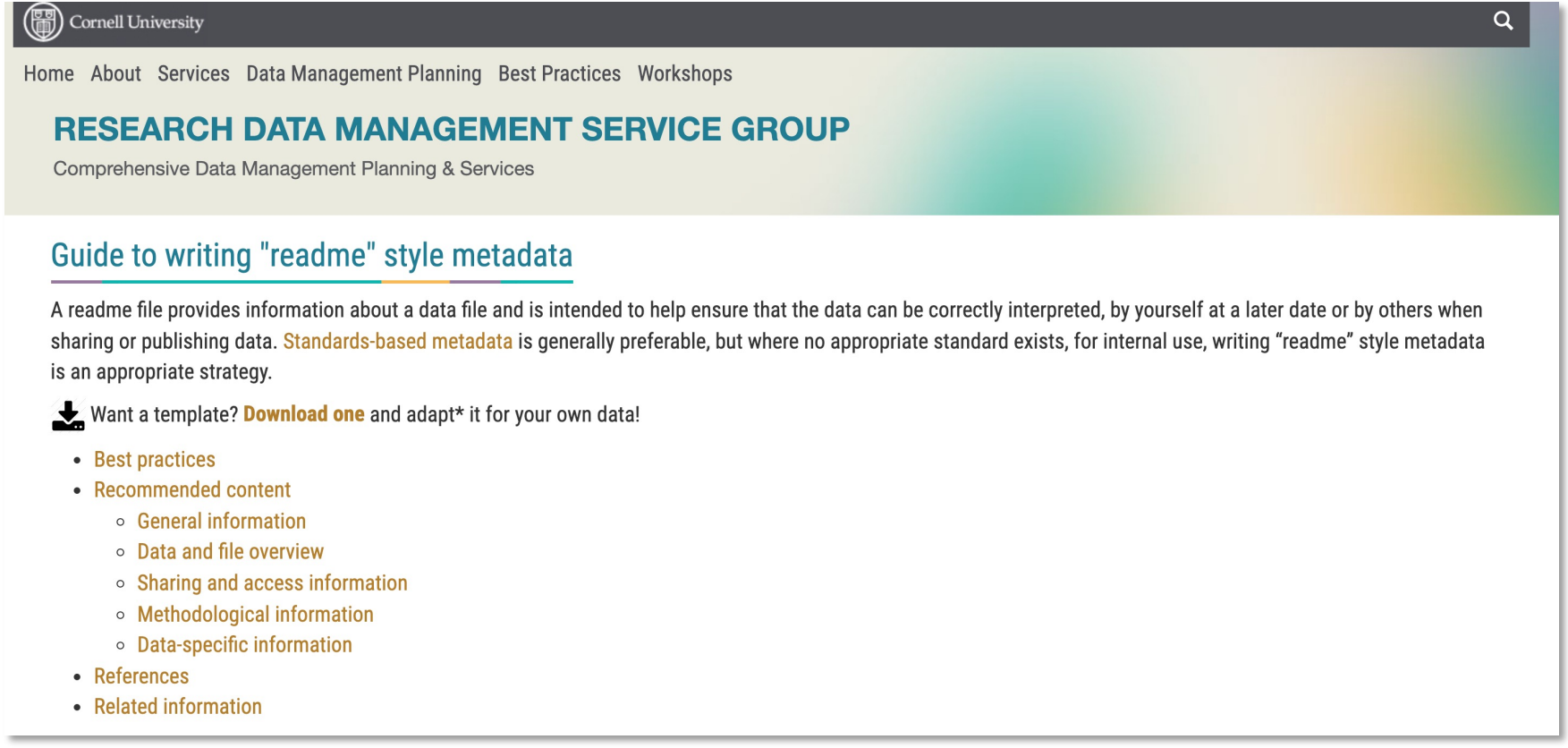
Two ways to include a README :
- Provide a separate README for each individual data file
- Submit one README for the data package as a whole

Dryad recommend that a README be a plain text file containing the following:

- for each filename, a short description of what data it includes, optionally describing the relationship to the tables, figures, or sections within the accompanying publication
- for tabular data: definitions of column headings and row labels; data codes (including missing data); and measurement units
- any data processing steps, especially if not described in the publication, that may affect interpretation of results
- a description of what associated datasets are stored elsewhere, if applicable
- whom to contact with questions
- If text formatting is important for your README, PDF format acceptable.

https://datadryad.org/stash/best_practices

Readme file template



Cornell University

Home About Services Data Management Planning Best Practices Workshops

RESEARCH DATA MANAGEMENT SERVICE GROUP

Comprehensive Data Management Planning & Services

Guide to writing "readme" style metadata

A readme file provides information about a data file and is intended to help ensure that the data can be correctly interpreted, by yourself at a later date or by others when sharing or publishing data. Standards-based metadata is generally preferable, but where no appropriate standard exists, for internal use, writing “readme” style metadata is an appropriate strategy.

Want a template? **Download one** and adapt* it for your own data!

- Best practices
- Recommended content
  - General information
  - Data and file overview
  - Sharing and access information
  - Methodological information
  - Data-specific information
- References
- Related information

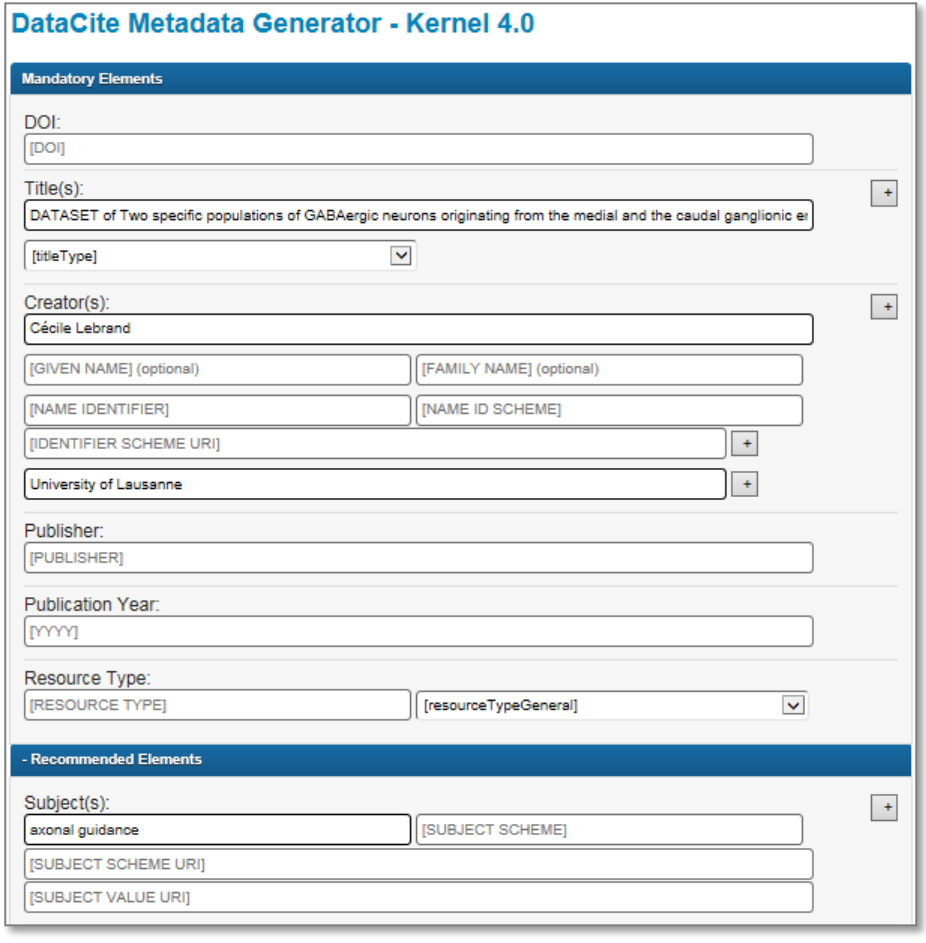
https://data.research.cornell.edu/content/readme

Readme file at UNIL for Long Term Storage

Readme XML or text file tool: DataCite Metada Generator

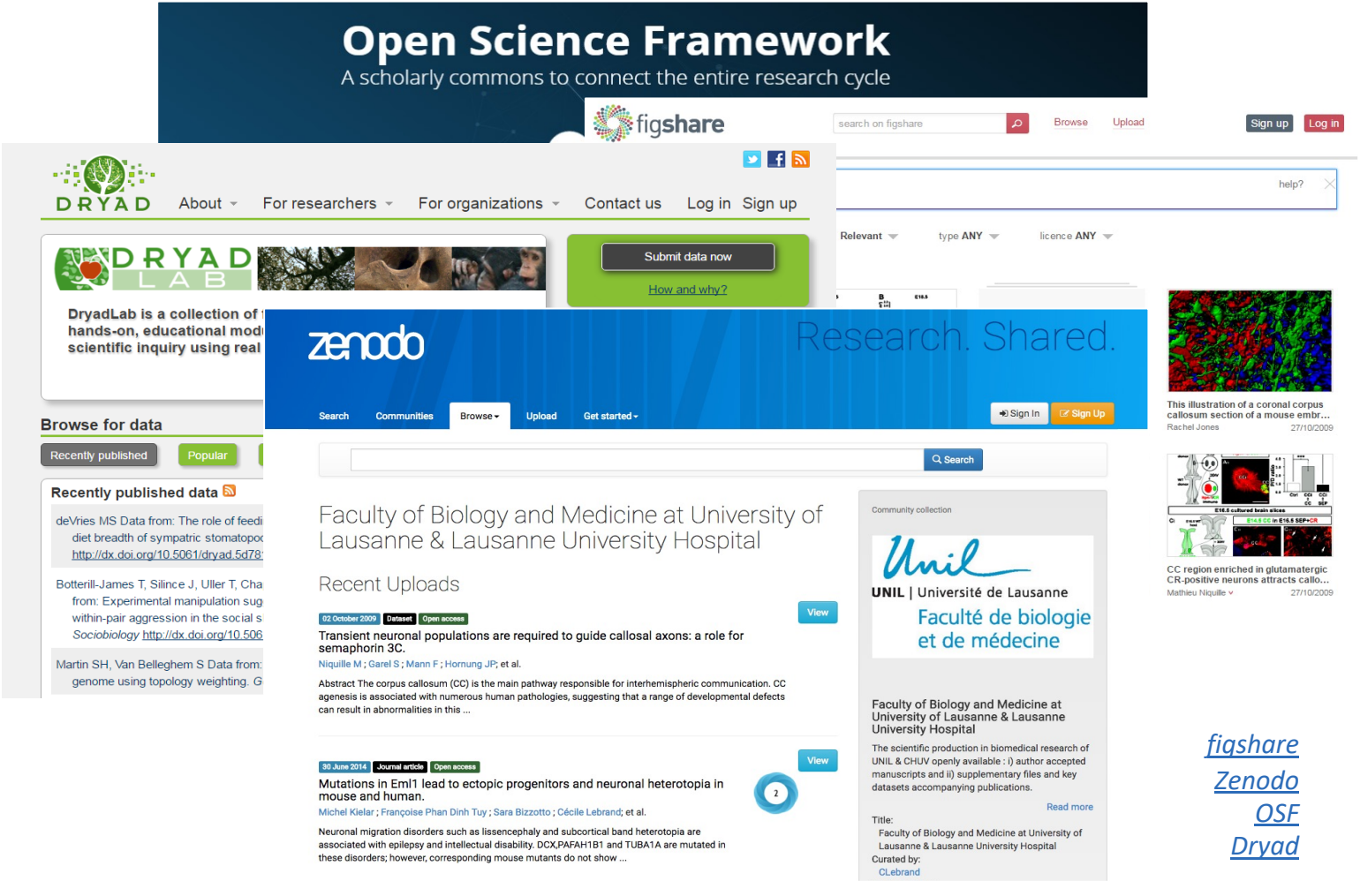
XML file automatically generated using the DataCite Metadata Generator after filing the form requesting intrinsic metadata.

Readme XML file ensures compatibility with international standards and is human as well as machine-readable.



DataCite Metadata Generator

Data Repositories



figshare
Zenodo
OSF
Dryad

Metadata associated with the dataset for data sharing

Files with Internal Metadata: e.g. microscope images contain a range of metadata (magnification, lens, zoom, gain, etc…).

Metadata for publishing datasets on nonprofit unstructured data repositories:

- XML metadata (machine readability / interoperability) generated after filing the repository submission form. Metadata comprise a persistent identifier, a publication date and conditions of access to (type of license) the dataset.
- Readme file(s) with the dataset in text with more detailed information.

Field specific metadata standards:
Digital Curation Center.
https://fairsharing.org/standards/?q

BiUM Metadata standards information

Metadata for Research Data

Take home message

- Metadata should be as complete as possible, using the standards and conventions of a discipline, and should be machine readable.
- Metadata should always accompany a dataset, no matter where it is stored.
- Many academic disciplines have formalized specific metadata standards.

3. ACTIVE PHASE

c. Data Access Management & Storage

mySNF Data Management Plan (DMP)

1. Data collection and documentation

- 1.1 What data will you collect, observe, generate or reuse?
- 1.2 How will the data be collected, observed or generated?
- 1.3 What documentation and metadata will you provide with the data?

2. Ethics, legal and security issues

- 2.1 How will ethical issues be addressed and handled?
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- 4.3 All digital repositories I will choose are conform to the FAIR Data Principles.
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Swiss National Science Foundation

2. 2. How will data access and security be managed?

Questions you might want to consider

- What are the main concerns regarding data security, what are the levels of risk and what measures are in place to handle security risks?
- How will you regulate data access rights/permissions to ensure the security of the data?
- How will personal or other sensitive data be handled to ensure safe data storage and transfer?

SNSF says…

If you work with personal or other sensitive data you should outline the security measures in order to protect the data. Please list formal standards which will be adopted in your study. An example is ISO 27001-Information security management. Furthermore, describe the main processes or facilities for storage and processing of personal or other sensitive data. (This relates to the *FAIR Data Principle* A1)

"who has access and with what restrictions"

Security issues

Data loss and/or leak

Measures

- Efficient backup
- Cloud-based storage
- Encryption of sensitive data

Security issues

Uncontrolled/Unwanted data access

- Global Malware Threats
- Data Theft or Corruption (virus)

Measures

- Firewall / VPN
- Institutional antivirus (automatic updates)
- OS and applications: applying security patches (regular updates)
- Caution with phishing
- Do not open attachments contained in unsolicited emails

Security issues

Uncontrolled/Unwanted data access

- Global Malware Threats
- Data Theft or Corruption (virus)
- Access rights

Measures

- Reduce permission rights of your files and folders to a strict minimum (in compliance with the group)

- Never change status to rwxrwxrwx

- If files not frequently used or archives: prevent unwanted deletion or modifications.
  Example: by removing corresponding access rights: r - - r - - - - -

Personal and sensitive data

Personal data

"any piece of information that someone can use to identify, with some degree of accuracy, a living person"

- A name and surname
- A home address
- An email address
- An identification card number
- Location data
- An Internet Protocol (IP) address

Sensitive data

"a specific set of "special categories" that must be treated with extra security"

- Racial or ethnic origin
- Political opinions
- Religious or philosophical beliefs
- Trade union membership
- Genetic data
- Biometric data (where processed to uniquely identify someone).

Source: http://itgovernance.co.uk

Personal and sensitive data

Data protection at the institution level

- The IT service should provide appropriate protection of hosted data on its technical infrastructure, including the confidentiality and integrity of the data. For information security, the Institution is (or plan to be) compliant with the following international standards: ISO 27001 - *International information security standard*.

Data protection at the group/individual level

- Sensitive data must be encrypted by your lab members for storage on NAS, or on USB/external disks or on laptops in case you have to use these supports.

Recommended: (internal) data sharing via SWITCHdrive and data transfer via SWITCHfilesender.

Collaborative data sharing: SWITCHdrive

SWITCHdrive

Store, synchronise, share and edit files quickly and reliably - all in the secure SWITCH cloud.

Facts at a glance

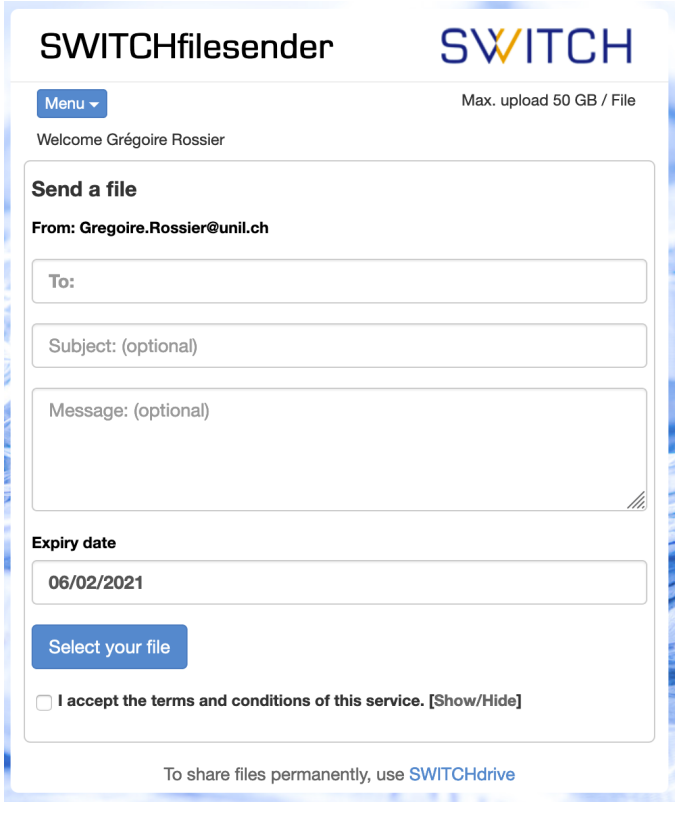
- Standard 100 GB online storage per user
- Easy collaboration and protected access with SWITCHaai or SWITCH edu-ID Login
- Synchronise files & folders across multiple devices
- Access via desktop client, browser or mobile application

Your data at SWITCH

- All data is stored on SWITCH servers in Switzerland.
- Full compliance with Swiss data protection regulations
- No data and metadata exchange with other Office companies - not even for diagnoses or future extensions.

No backup!

Data transfer: SWITCHfilesender



- Send or receive large files by mail notification
- Max 300 GB
- Web based, nothing to install
- Set expiration date
- Invite guests
- More information: *https://www.switch.ch/services/filesender/*

mySNF Data Management Plan (DMP)

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3.1. How will your data be stored and backed-up during the research?

Questions you might want to consider:

- What is your storage capacity and where will the data be stored?
- What are the back-up procedures?

SNSF says...

Please mention what the needs are in terms of data storage and where the data will be stored. Please consider that data storage on laptops or hard drives, for example, is risky. Storage through IT teams is safer. If external services are asked for, it is important that this does not conflict with the policy of each entity involved in the project, especially concerning the issue of sensitive data. Please specify your back-up procedure (frequency of updates, responsibilities, automatic/manual process, security measures, etc.)

Researchers are responsible for the safety, security and integrity of the data they generate.

Available storage solutions

- *Computer hard drive or external hard drive*
- Network Attached Storage (NAS)
- Remote servers (secured for sensitive data)
- Cloud service solutions (Switch, OneDrive, Dropbox, GoogleDrive)

Don’t pull all your eggs in one basket!

Credit: By Bryan Tong Minh / CC-BY-2.5 (http://commons.wikimedia.org/wiki/File:Brand_bouwkunde_-_TU_Delft_-_13_Mei_2008.jpg)

Institutional storage

Network Attached Storage NAS

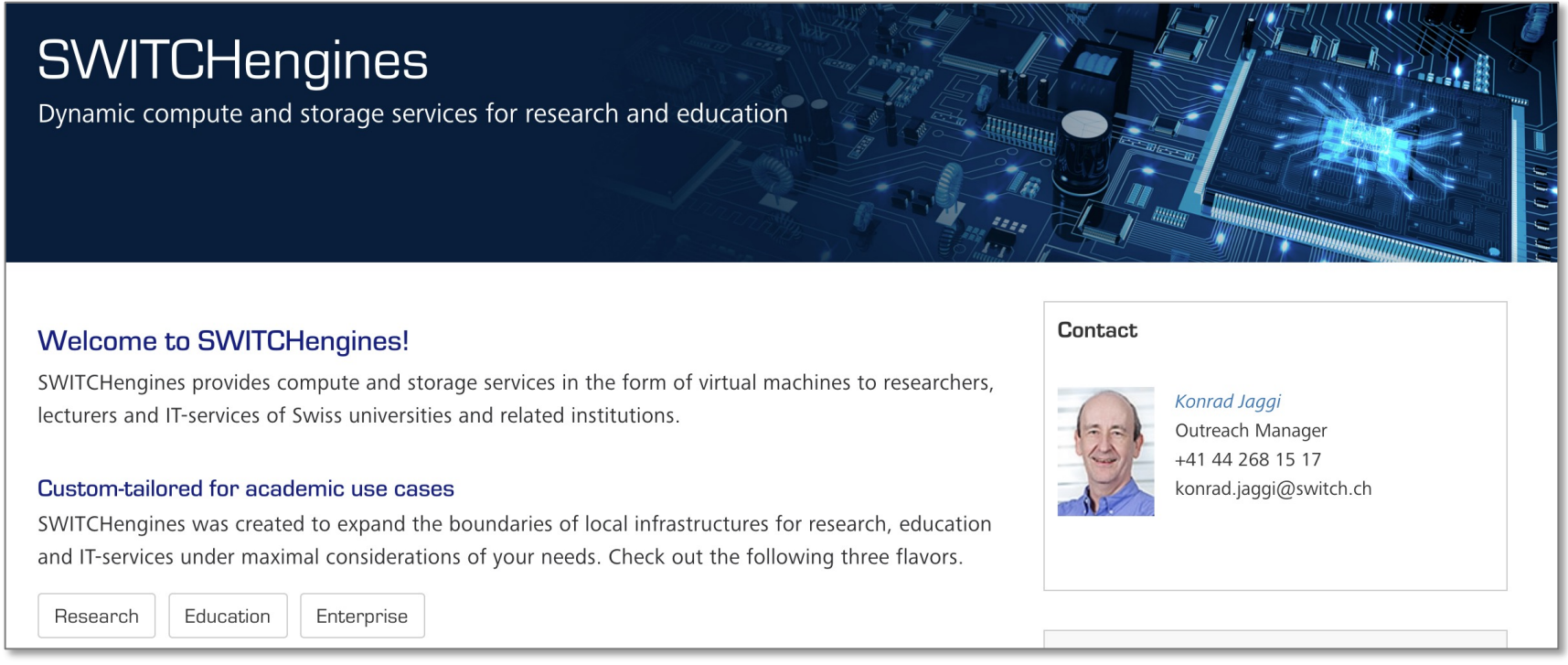
- Access to files from anywhere in the world (with VPN)
- High upload/download speeds
- Very high resistance to hardware and software failures
- Security measures (protection against viruses, loss of data, etc)

Data back-up and safeguarding (UNIL example)

- Incremental backup (snapshot)
- Full daily backup of the data (2 times per day, 90 days retention)
- Replication of the data on a second NAS in another building (every 4 hours)
- Third copy

Prices vary and depend on needs – talk to your institution

Other Swiss storage options: SWITCHengines



Other Swiss storage options: data@SWITCH

Data@SWITCH

Data@SWITCH

Storage services that meet your needs – all in the secure SWITCH cloud

Short-term and long-term storage for large volumes of data

SWITCHfilesender

«I would like to send large volumes of data easily and securely.»

SWITCHdrive

«I would like to store files, share them with others and work on them together.»

SWITCHengines storage

«I would like to store large volumes of data, e.g. for off-site backups or sharing of datasets.»

SWITCHcoldstor

«I would like to store data in an archive for a longer period of time e.g. for regulatory reasons, or data management purposes.»

SWITCHtube

«I would like to make videos available to my students securely.»

4. CONCLUDING PHASE

a. Data Preservation

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Swiss National Science Foundation

3.2. What is your data preservation plan?

Questions you might want to consider

- What procedures would be used to select data to be preserved?
- What file formats will be used for preservation?

SNSF says...

Please specify which data will be retained, shared and archived after the completion of the project and the corresponding data selection procedure (e.g. long-term value, potential value for re- use, obligations to destroy some data, etc.). Please outline a long-term preservation plan for the datasets beyond the lifetime of the project. In particular, comment on the choice of file formats and the use of community standards. (This relates to the *FAIR Data Principles* F2 & R1.3)

Scientists losing data at a rapid rate

MISSING DATA

As research articles age, the odds of their raw data being extant drop dramatically.

Probability of finding the data associated with a paper declined by 17% every year

https://www.nature.com/news/scientists-losing-data-at-a-rapid-rate-1.14416

Long term data archiving

Archive collected data on long term storage space for at least 10 years (e.g. UNIL Directive 4.2, art. 2.4).

Appropriate data archiving is under the responsibility of the Principal investigator Prof. X.

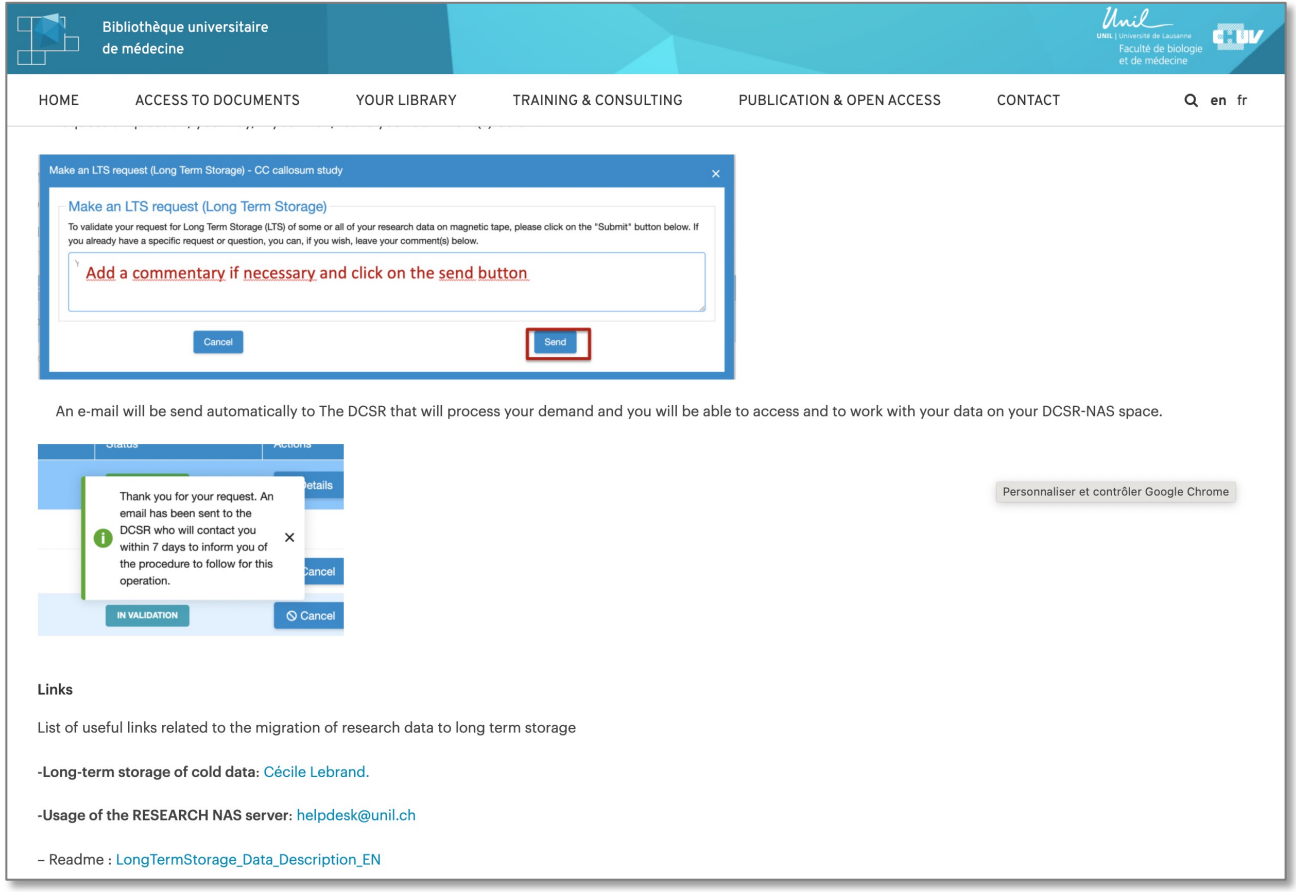
Published data

- Deposition and sharing data via repositories will ensure longevity.
- Long Term Storage of research data supporting published articles for at least 10 years after publication.

Unpublished data

- Save unpublished high-quality final data for re-use.
- Bad quality data should be permanently discarded.

Long Term Storage for « cold data » on a cost effective magnetic tape solution

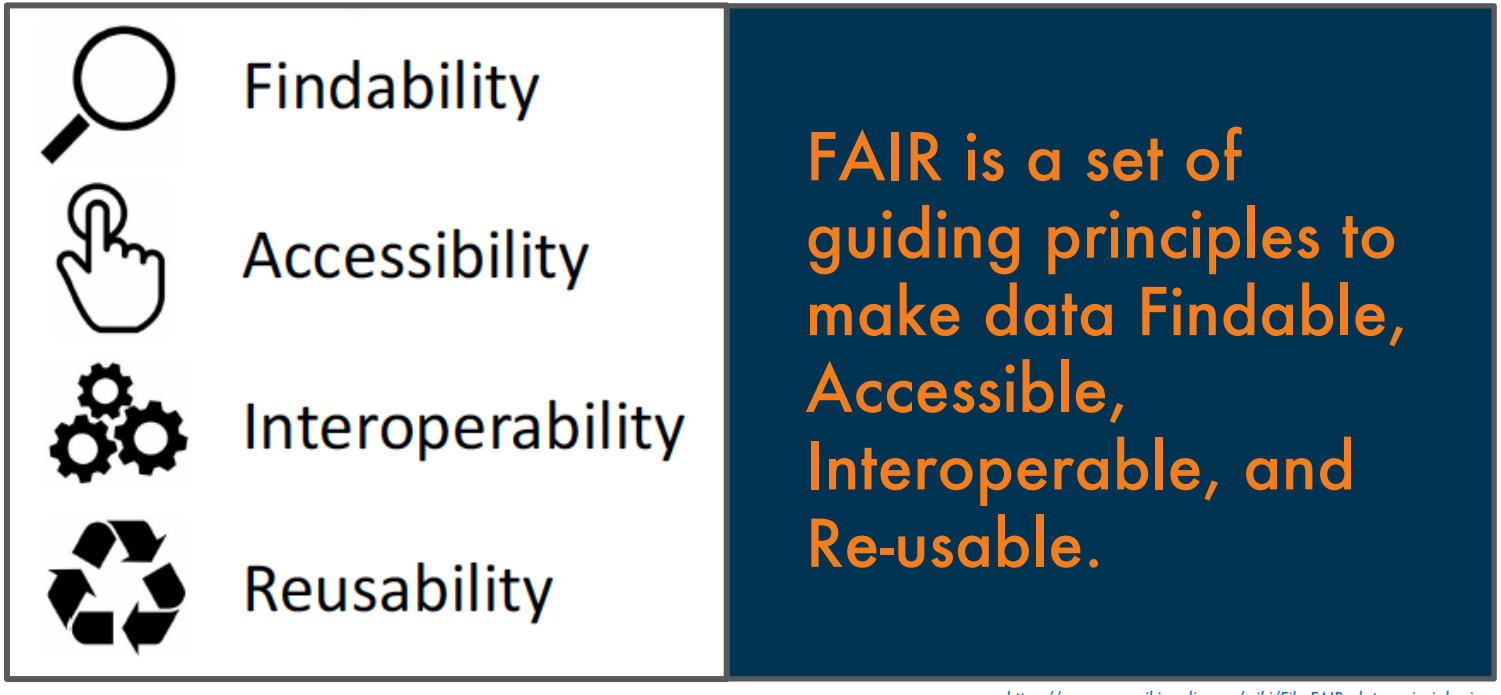


https://www.bium.ch/processus-dhebergement-donnees-de-recherche-stockage-a-long-terme/

4. CONCLUDING PHASE

b. FAIR Principles In Depth

The FAIR data principles



https://commons.wikimedia.org/wiki/File:FAIR_data_principles.jpg

- *FAIR Data Principles*
- *SNSF Explanation of the FAIR Data Principles (PDF)*
- *Wilkinson et al. (2016), The FAIR Guiding Principles for scientific data management and stewardship, Scientific Data 3, doi:10.1038/sdata.2016.18 (PDF)*

The FAIR data principles

The FAIR Guiding Principles for scientific data management and stewardship.

Wilkinson et al.

Sci Data. 2016 Mar 15;3:160018. doi: 10.1038/sdata.2016.18.

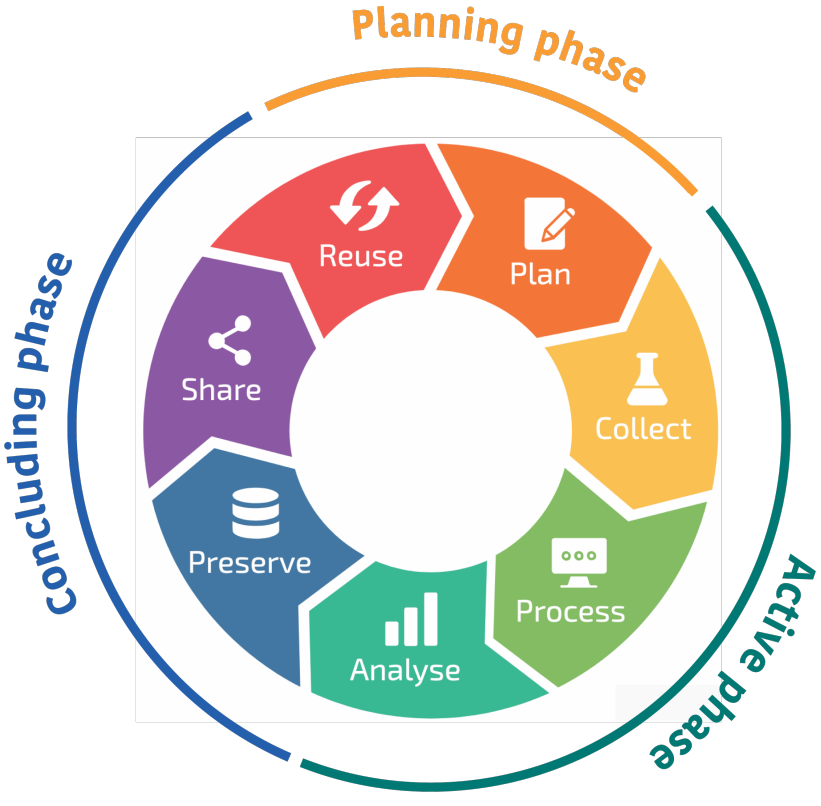
to as the FAIR Data Principles. The intent is that these may act as a guideline for those wishing to enhance the reusability of their data holdings. Distinct from peer initiatives that focus on the human scholar, the FAIR Principles put specific emphasis on enhancing the ability of machines to automatically find and use the data, in addition to supporting its reuse by individuals. This Comment is the first formal publication of the FAIR Principles, and includes the rationale behind them, and some exemplar implementations in the community.

A set of guiding principles to enhance

- **the value of all digital resources and**
- **its findability and use by *machines* and**
- **its reuse by *individuals***

Support FAIR by design

Ideally, we should support **FAIR data** by-design, from the first steps of data management planning to the final steps of depositing data in public archives



https://rdmkit.elixir-europe.org/

The FAIR principles

inspired by

Swim icons created by Freepik - Flaticon

Mark D. Wilkinson - info@fairdata.systems

The FAIR principles

Can I find the data I want (unambiguously!) ?

➡ *Unambiguous identifiers supported by searchable metadata*

F1. (Meta)data are assigned a **globally unique** and **persistent identifier**
F2. Data are described with rich metadata (defined by R1 below)
F3. Metadata clearly and explicitly include the identifier of the data they describe
F4. (Meta)data are registered or indexed in a searchable resource

=> someone else could not reuse/reassign the same identifier without referring to your data
=> identifiers (links) should not become invalid over time

Examples

http://www.uniprot.org/uniprot/P98161 (=> *https://www.uniprot.org/uniprotkb/P98161/entry*)

https://doi.org/10.6084/m9.figshare.2056767.v2

Globally unique and persistent identifiers are often provided by the repository or from a registry service.

The FAIR principles

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F4. (Meta)data are registered or indexed in a searchable resource

=> “rich metadata” in F is for discovery, they describe what your dataset is about

<u>Examples</u>

Title, description, last version update, …

(Rich metadata in R is for reusability

The FAIR principles

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Unambiguous identifiers supported by searchable metadata

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=> the data identifier should be included in the metadata …

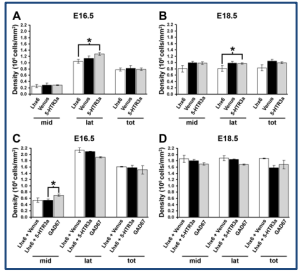
Why?

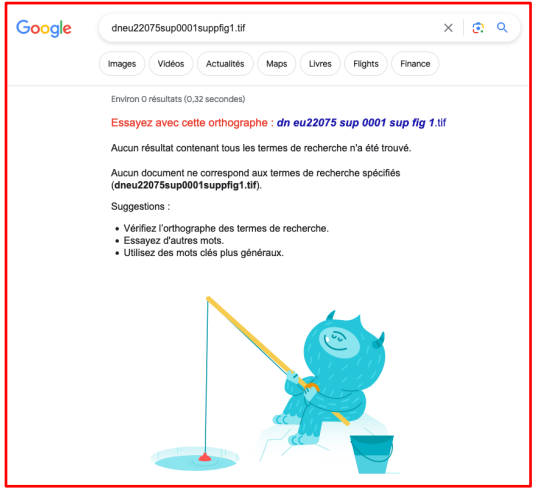
Sometimes the metadata becomes separated from the data;
Thus depending on how someone finds your data, it may be impossible to find a link back to the data or to the metadata …

The FAIR principles – F3

https://www.metadata2go.com/

dneu22075sup0001suppfig1.tif





METADATA2GO.com All tools

Metadata Info Of Your File

The following table contains all the exif data and metadata

file_name
dneu22075sup0001suppfig1.tif

file_size
398 kB

file_type
TIFF

file_type_extension
tif

mime_type
image/tiff

exif_byte_order
Big-endian (Motorola, MM)

subfile_type
Full-resolution image

image_width
1854

image_height
1694

bits_per_sample
8 8 8

software
Adobe Photoshop CS5 Macintosh

modify_date
2013:02:10 22:29:01

predictor
Horizontal differencing

xmp_toolkit
Adobe XMP Core 5.0-c060 61.134777, 2010/02/12-17:32:00

format
image/tiff

creator_tool
Adobe Photoshop CS4 Windows

create_date
2010:11:20 12:31:35+01:00

metadata_date
2013:02:10 22:29:01+01:00

document_id
uuid:F18178BB99F4DF119153B33BCB6278CB

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⇒ automated indexation by Google, Bing, …
⇒ specific metadata indexes: data catalog (DCAT), …

Examples

https://www.fairdatapoint.org/

IMI Data Catalog - https://datacatalog.elixir-luxembourg.org/

The FAIR principles

Is there a way to access the data? Is it technically possible?

➡ *Clearly-defined access protocol, preferably machine-actionable*

A1. (Meta)data are **retrievable** by their identifier using a standardised communications protocol
- A1.1 The protocol is open, free, and universally implementable
- A1.2 The protocol allows for an authentication and authorisation procedure, where necessary

A2. Metadata are accessible, even when the data are no longer available

⇒ focuses on how data and metadata can be retrieved (not "resolved"; A1 does not require web!)
⇒ defines what the protocol is to request access to the data (to be compliant)

The FAIR principles

Is there a way to access the data? CAN I re-use the data? Is it technically possible?

➡ *Clearly-defined access protocol, preferably machine-actionable*

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⇒ whatever the protocol, one should not have to buy a licence to use the tools required to access the data

Examples

https, sFTP …
Telephone! (yes: the protocol may involve human intervention)

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⇒ focuses on how data and metadata can be retrieved (not "resolved"; A1 does not require web!)
⇒ one needs to define what the protocol is to request access to the data to be compliant

⇒ whatever the protocol, one should not have to buy a licence to use the tools required to access the data

Examples

https, sFTP …
Telephone! (yes: the protocol may involve human intervention)

⇒ open protocol, not open data!
⇒ authorization via telephone, email, web, …

FAIR ≠ Open Data

The FAIR principles

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A1.2 The protocol allows for an authentication and authorisation procedure, where necessary
A2. Metadata are accessible, even when the data are no longer available

⇒ It is therefore recommended that data and metadata are separated!
1 database for the metadata and 1 database for the data;
do not embed all the metadata in the images;

Why?

⇒ metadata are more discoverable by metadata aggregators, such as OpenAIR https://www.openaire.eu/
⇒ metadata are valuable even if the data is lost or not available anymore

The FAIR principles

Can I understand the data? or better, can my machine understand the data?

➡ Use shared vocabularies/ontologies in machine-accessible format

I1. (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
I2. (Meta)data use vocabularies that follow FAIR principles
I3. (Meta)data include qualified references to other (meta)data

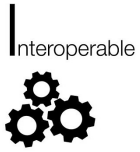
⇒ most widely used for FAIRfication projects: Resource Description Framework (RDF)

Why?

Standard specifically designed to describe any type of information in a structured and machine-readable format.

Alternatives:
- JSON-LD – JavaScript Object Notation for Linking Data - https://json-ld.org/
- Microdata - https://en.wikipedia.org/wiki/Microdata_(HTML)
- …

The FAIR principles



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I3. (Meta)data include qualified references to other (meta)data

⇒ the vocabularies describing the (meta)data must themselves be Findable, Accessible, Interoperable and Reusable

The FAIR principles

Interoperable

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qualified references

⇒ cross-references that explains its intent: "… is a regulator of …"

P04278 · SHBG_HUMAN

Protein[i]	Sex hormone-binding globulin
Gene[i]	SHBG
Status[i]	UniProtKB reviewed (Swiss-Prot)
Organism[i]	Homo sapiens (Human)

```
SELECT ?protein ?organism
WHERE
{
    ?protein a up:Protein .
    ?protein up:organism taxon:9606 .
}
```

Are these good qualified references?

For humans, yes. But not for machines …

The FAIR principles

Am I allowed to use the data? SHOULD I re-use the data? Is it useful for me?

- Contextual information, allowing proper interpretation
- Rich provenance information facilitating accurate citation

R1. (Meta)data are richly described with a **plurality** of accurate and relevant attributes
- R1.1. (Meta)data are released with a clear and accessible data usage license
- R1.2. (Meta)data are associated with detailed provenance
- R1.3. (Meta)data meet domain-relevant community standards

⇒ focuses on the ability of a user (machine or human) to decide if the data is actually USEFUL
⇒ metadata richly describes the context under which the data was generated
plurality : do as much as you can; be generous;

<u>Examples</u>

experimental protocol
the manufacturer and brand of the machine or sensor that created the data
the species used
the drug regime
the particularities, the limitations
…

(Rich metadata in F is for discovery)

The FAIR principles

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⇒ data *usage* license: bad wording
(license or data access policy would have been better)

The conditions under which the data can be used should be clear to machines and humans.

The FAIR principles

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⇒ they should allow the user to decide whether or not they trust the data

what did you do?
what organism was used?
what protocols were followed?
what was the question?
which workflows, software and versions of, filters?
who and how to cite?
etc.

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⇒ "catch-all"

⇒ in addition to all the previous principles, you need to adhere to community standards

you should use your community standard …
… even if it's not FAIR! And then you should also use a FAIR standard

The FAIR principles

Can I find the data I want (unambiguously!) ?

➡ Unambiguous identifiers supported by searchable metadata

Is there a way to access the data? CAN I re-use the data? Is it technically possible?

➡ Clearly-defined access protocol, preferably machine-actionable

Can I understand the data? or better, can my machine understand the data?

➡ Use shared vocabularies/ontologies in machine-accessible format

Am I allowed to use the data? SHOULD I re-use the data? Is it useful to my problem?

➡ Contextual information, allowing proper interpretation

➡ Rich provenance information facilitating accurate citation

https://www.go-fair.org/fair-principles/

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The FAIR principles

To be Findable

F1. (meta)data are assigned a globally unique and eternally persistent identifier.
F2. data are described with rich metadata.
F3. metadata include the data identifier it describes.
F4. (meta)data are registered or indexed in a searchable resource.

To be Accessible

A1 (meta)data are retrievable by their identifier using a standardized communications protocol.
A1.1 the protocol is open, free, and universally implementable.
A1.2 the protocol allows for an authentication and authorization procedure, where necessary.
A2 metadata are accessible, even when the data are no longer available.

To be Interoperable

I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
I2. (meta)data use vocabularies that follow FAIR principles.
I3. (meta)data include qualified references to other (meta)data.

To be Re-usable

R1. meta(data) have a plurality of accurate and relevant attributes.
R1.1. (meta)data are released with a clear and accessible data usage license.
R1.2. (meta)data are associated with their provenance.
R1.3. (meta)data meet domain-relevant community standards.

https://www.go-fair.org/fair-principles ***https://www.force11.org/group/fairgroup/fairprinciples***

How FAIR is your data?

Screening of ~5500 FDA-approved drugs and clinical candidates for anti-SARS-CoV-2 activity

Van Damme, Ellen

This report describes the most relevant results of screening a drug repurposing library consisting of ~5500 FDA-approved drugs and clinical candidates that have passed phase I studies for activity against SARS-CoV-2.
https://zenodo.org/record/4774709

Screening of ~5500 FDA-approved drugs and clinical candidates for anti-SARS-CoV-2 activity.xlsx (Demo)

Pre-fairification

The disadvantage of depositing in Zenodo is that Zenodo is not the primary archive for bioactivity data discovery.
There are only 75 views and 23 downloads of the CARE dataset from May 2021 to Sept. 2021.

Select the appropriate repository for your data

Also with limited metadata packed in a spreadsheet, it is difficult to find the dataset.

Metadata and ontologies are crucial

https://fairplus-project.eu/

https://www.imi.europa.eu/projects-results/project-factsheets/fairplus

FAIRplus FAIRification Process

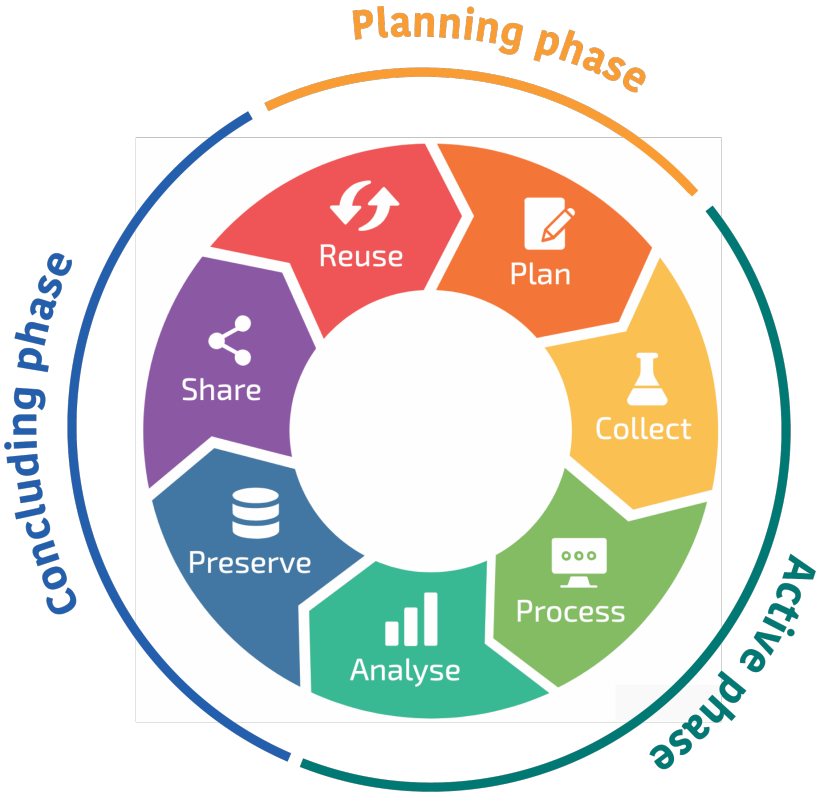
1. Define FAIRification Goal – "competency question"
    1. Findability
    2. Reusability

2. Data Examination
    1. Identify Data requirements - what you have
    2. Identify Data FAIRification Capabilities – what you can do
    3. Identify Data FAIRification Resources – who does what

3. Design Decisions - including cost-benefit evaluation

4. Implementation Phase
    1. Generate InChI and SMILE identifiers
    2. Map data to the ChEMBL submissions model
    3. BioAssay Ontology (BAO), CHEMINF vocabularies for compound annotation
    4. Cellosaurus ID for cell line
    5. ChEMBL license used for data sharing, CC-SA 3.0

FAIR hands-on course automn 2023!



Adapted from https://rdmkit.elixir-europe.org/data_life_cycle

4. CONCLUDING PHASE

c. Data Sharing & Reuse

mySNF Data Management Plan (DMP)

1. Data collection and documentation

- 1.1 What data will you collect, observe, generate or reuse?
- 1.2 How will the data be collected, observed or generated?
- 1.3 What documentation and metadata will you provide with the data?

2. Ethics, legal and security issues

- 2.1 How will ethical issues be addressed and handled?
- 2.2 How will data access and security be managed?
- 2.3 How will you handle copyright and Intellectual Property Rights issues?

3. Data storage and preservation

- 3.1 How will your data be stored and backed-up during the research?
- 3.2 What is your data preservation plan?

4. Data sharing and reuse

- 4.1 How and where will the data be shared?
- 4.2 Are there any necessary limitations to protect sensitive data?
- 4.3 All digital repositories I will choose are conform to the FAIR Data Principles.
- 4.4 I will choose digital repositories maintained by a non-profit organisation.

Swiss National Science Foundation

4.1. How and where will the data be shared?

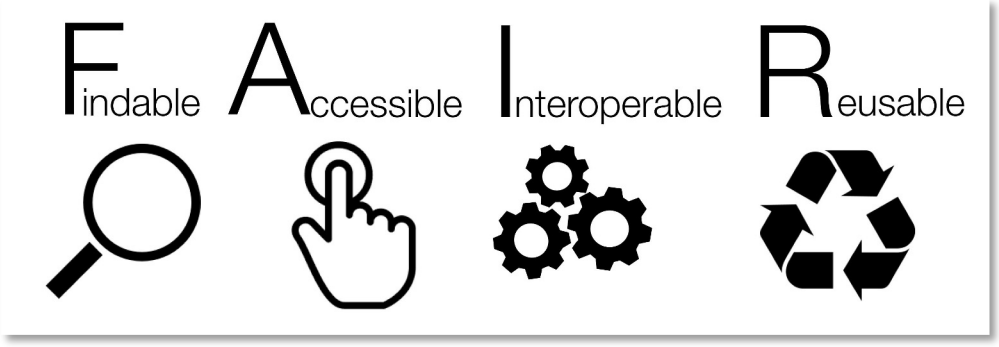
Questions you might want to consider

- On which repository do you plan to share your data?
- How will potential users find out about your data?

SNSF says…

Consider how and on which repository the data will be made available. The methods applied to data sharing will depend on several factors such as the type, size, complexity and sensitivity of data. Please also consider how the reuse of your data will be valued and acknowledged by other researchers. (This relates to the *FAIR Data Principles* F1, F3, F4, A1, A1.1, A1.2 & A2)

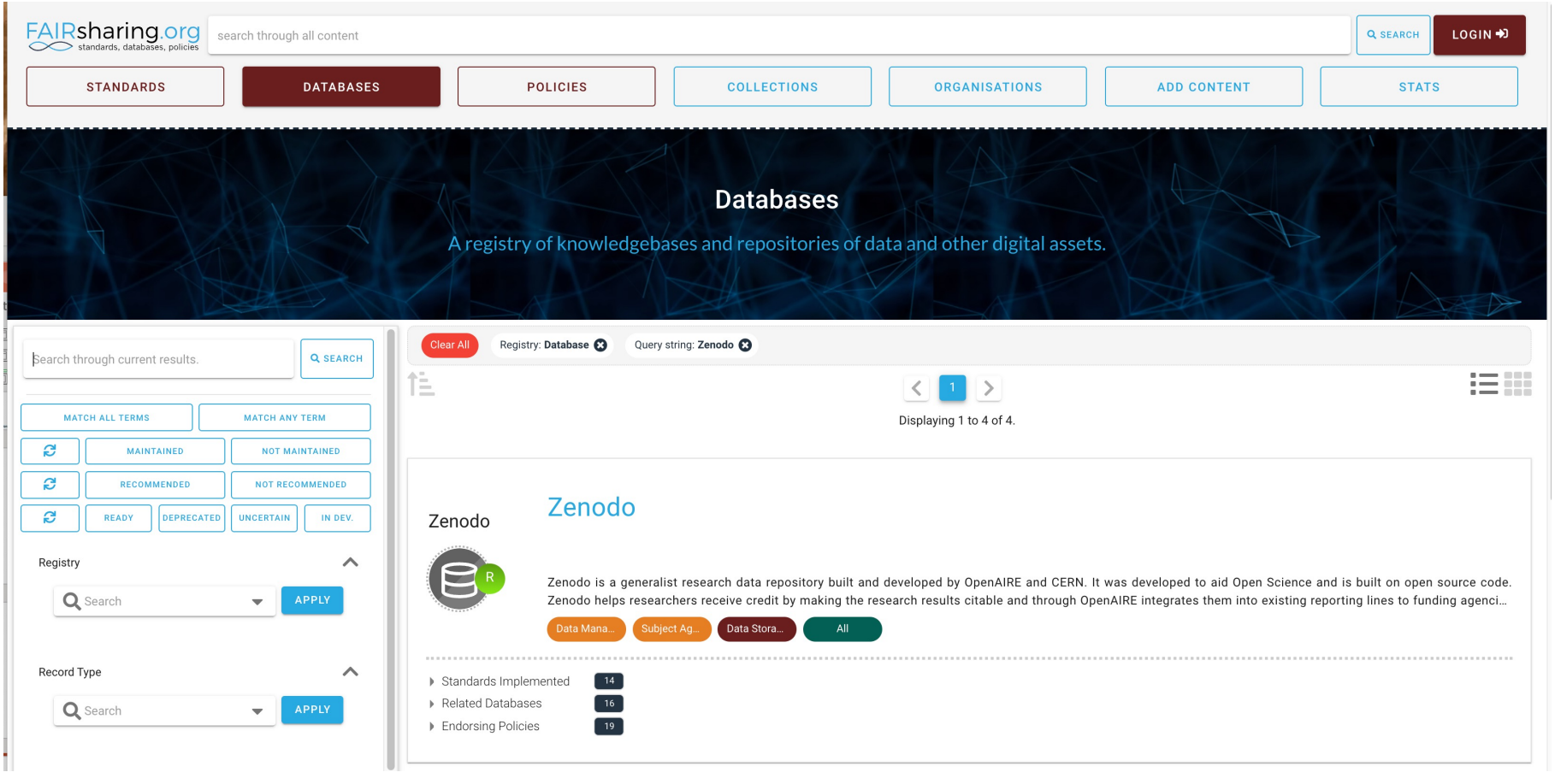
FAIR data repositories: SNSF info



Finding the "perfect" repository providing all necessary features to host FAIR data is challenging. To make the transition towards FAIR research data easier, the SNSF decided to fix a set of minimal criteria that repositories have to fulfil to conform with the FAIR data principles.

- *Guidelines*
- *Examples of data repositories (PDF)*
- *Dunning et al. (2017), Evaluation of data repositories based on the FAIR Principles for IDCC 2017 practice paper, TU Delft, Data Set, doi:10.4121/uuid:5146dd06-98e4-426c-9ae5-dc8fa65c549f*

Registry of FAIR Data Repositories



https://fairsharing.org/search?fairsharingRegistry=Database

Data submission wizard to find the right repository at EMBL

Data submission

Use this data submission wizard to find the right archive for your data in a few simple steps.

1 What **type of data** do you have?

DNA/RNA sequence | Expression data | Protein data | Structures | Systems

Chemical biology | Ontologies | Images | Multi-omics or other cross-domain study

Other biological research data

Why submit data to an archive?

- Submission of primary data and derived information to public data repositories is an essential step in the scientific process.
- Through submission, the scientific community is fed the raw materials for the building and maintenance of the complete and up-to-date data sets that support searches and analysis on the latest sequences, structures and molecular profiles of living systems.
- Serving as a complement to the literature publication process and supporting early data sharing, the EMBL-EBI offers a number of submission services appropriate for different types and scales of data.

Need help?

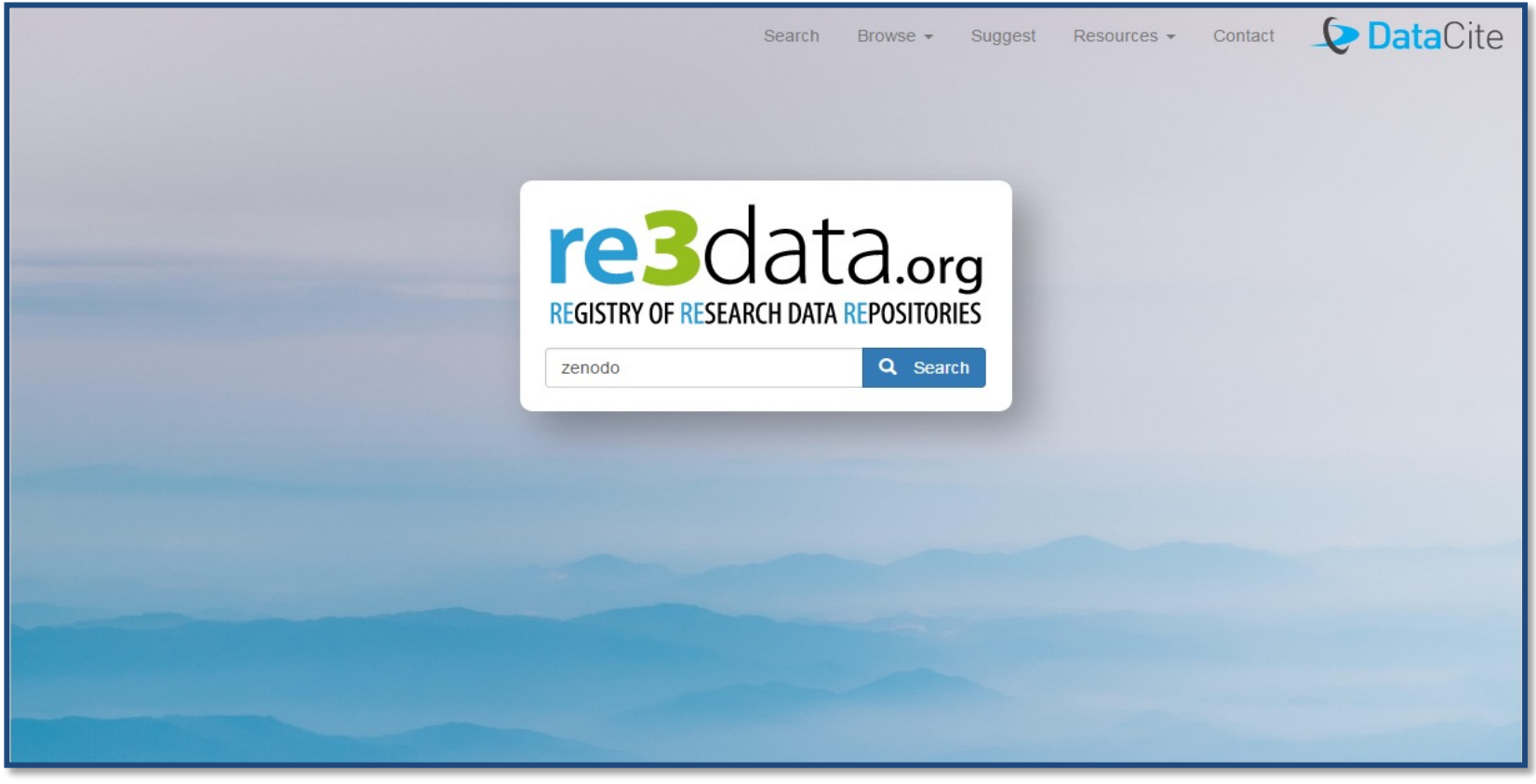
If you need help with your data submission, please contact support.

All EMBL-EBI data repositories

Array Express: functional genomics data
BioImage Archive: bioimaging data
BioModels: computational models
BioSamples: reference sample data
BioStudies: biological research data
ChEBI: chemical entities
DGVa: structural genetic variation data
EFO: experimental variables
EGA: human data that requires controlled access
EMPIAR: raw image data
ENA: nucleotide sequence data
EVA: genetic variation data
GO: Gene ontology annotations
GWAS Catalog: Genome-wide association study data
IntAct: molecular interactions
IntEnz: enzyme nomenclature
MetaboLights: metabolomics data
Metagenomics: raw sequence data & associated meta-data
OneDep: electron microscopy, X-ray crystallography & NMR data
PRIDE: protein & peptide identification data
UniProt SPIN: protein sequences & annotations
UniProt: updates or corrections

https://www.ebi.ac.uk/submission/

Registry of Data Repositories



http://www.re3data.org/

Find the right repository for your data

http://www.nature.com/sdata/policies/repositories

Browse our recommended data repository online.

- *We currently list more than 90 repositories, across the biological, physical and social sciences*
- *We advise authors on the best place to store their data*

Domain-specific public repositories

Sequencing
dbSNP
dbVar
Database of Genomic Variants Archive (DGVa)
DNA DataBank of Japan (DDBJ)
EBI Metagenomics
EMBL Nucleotide Sequence Database (ENA)
European Variation Archive (EVA)
GenBank
miRBase
NCBI Sequence Read Archive (SRA)
NCBI Trace Archive
Uniprot

Omics
ArrayExpress
Biological General Repository for Interaction Datasets (BioGRID)
Database of Interacting Proteins (DIP)
dbGAP
The European Genome-phenome Archive (EGA)
IntAct Molecular Interaction Database
Gene Expression Omnibus (GEO)
GenomeRNAi
GPM DB
MetaboLights
NURSA
PeptideAtlas
Proteomics Identifications (PRIDE)
ProteomeXchange

Structural Databases
Biological Magnetic Resonance Data Bank (BMRB)
Crystallography Open Database (COD)
Coherent X-ray Imaging Data Bank (CXIDB)
Electron Microscopy Data Bank (EMDB)
FlowRepository
Protein Circular Dichroism Data Bank (PCDDB)
Worldwide Protein Data Bank (wwPDB)

Neuroscience
Functional Connectomes Project International Neuroimaging Data-Sharing Initiative (FCP/INDI)
NeuroMorpho.org
OpenfMRI

Model Organisms
Eukaryotic Pathogen Database Resources (EuPathDB)
FlyBase
Mouse Genome Informatics (MGI)
Rat Genome Database (RGD)
SmedGD
The Arabidopsis Information Resource (TAIR)
VectorBase
WormBase
Xenbase
Zebrafish Model Organism Database (ZFIN)

Taxonomic & Species Diversity
Integrated Taxonomic Information System (ITIS)
Global Biodiversity Information Facility (GBIF)
NCBI Taxonomy
The Knowledge Network for Biocomplexity

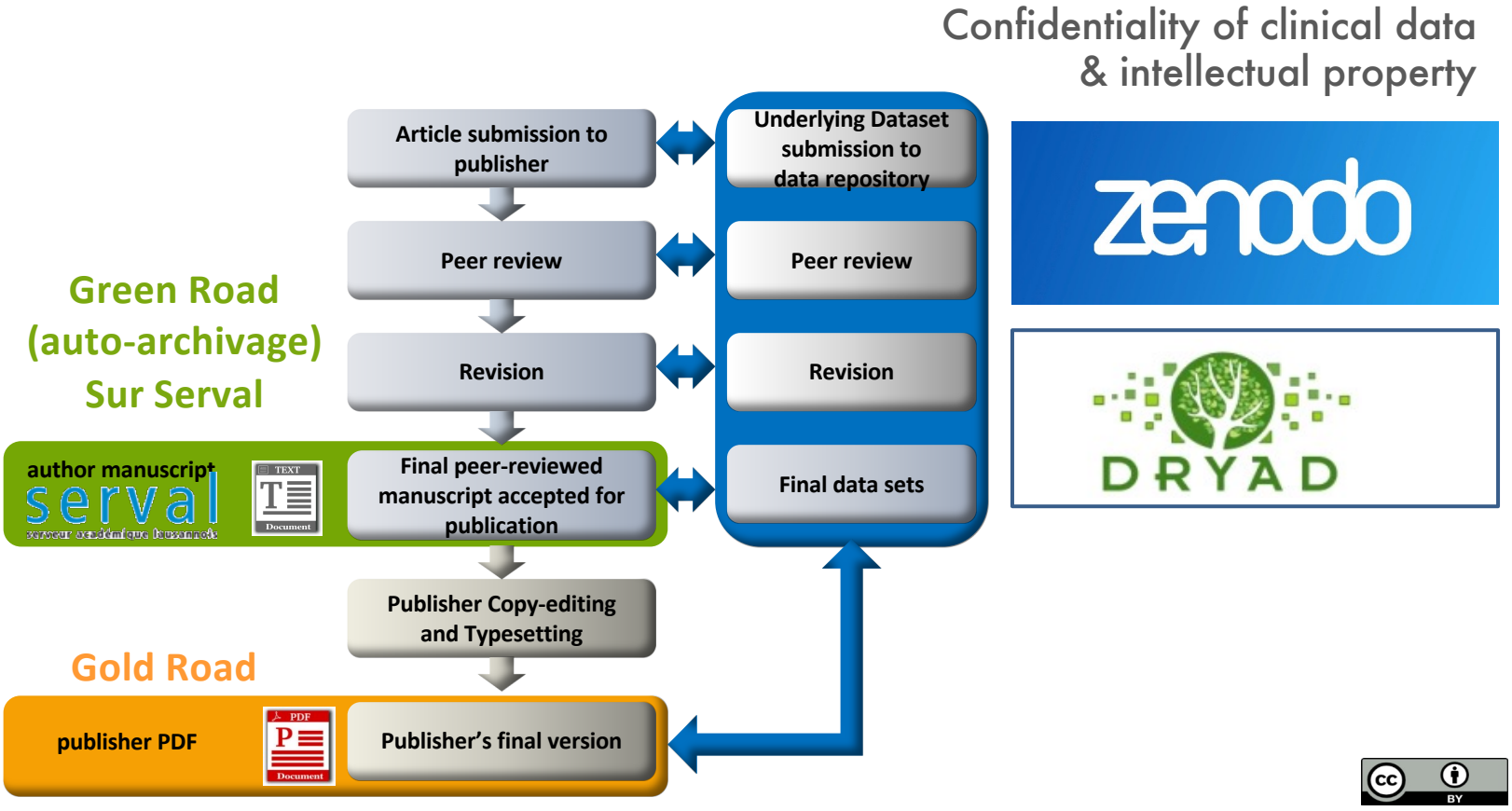
Biomedical Sciences
Influenza Research Database
National Addiction & HIV Data Archive Program (NAHDAP)
National Database for Autism Research (NDAR)
The Cancer Imaging Archive (TCIA)
SICAS Medical Image Repository
PhysioNet

Biochemistry
caNanoLab
Kinetic Models of Biological Systems (KiMoSys)
The Mass spectrometry Interactive Virtual Environment (MassIVE)
PubChem

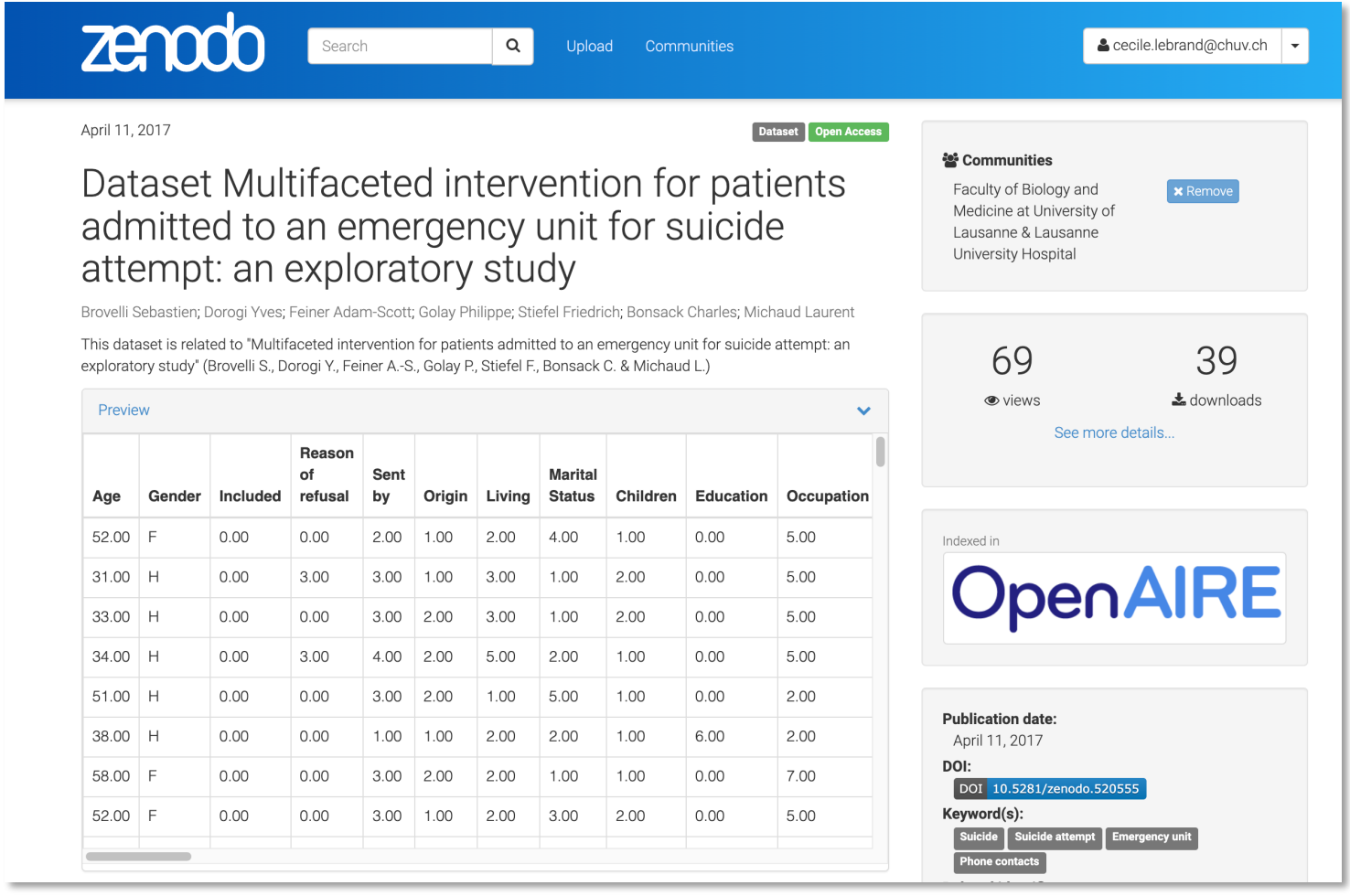
Social sciences
Inter-university Consortium for Political and Social Research (ICPSR)
Qualitative Data Repository
Swedish National Data Service
Data Archiving and Networking Services (DANS)

http://journals.plos.org/plosone/s/data-availability#loc-recommended-repositories
https://figshare.com/articles/Scientific_Data_recommended_repositories_June_2015/1434640

Dataset versions, Data repositories & Open Data



Communauté FBM sur Zenodo (dépôt H2020) pour dépôt de sets de données non structurées



zenodo

Search

Upload Communities

cecile.lebrand@chuv.ch

April 11, 2017

Dataset Open Access

Dataset Multifaceted intervention for patients admitted to an emergency unit for suicide attempt: an exploratory study

Brovelli Sebastien; Dorogi Yves; Feiner Adam-Scott; Golay Philippe; Stiefel Friedrich; Bonsack Charles; Michaud Laurent

This dataset is related to "Multifaceted intervention for patients admitted to an emergency unit for suicide attempt: an exploratory study" (Brovelli S., Dorogi Y., Feiner A.-S., Golay P., Stiefel F., Bonsack C. & Michaud L.)

Preview

Age	Gender	Included	Reason of refusal	Sent by	Origin	Living	Marital Status	Children	Education	Occupation
52.00	F	0.00	0.00	2.00	1.00	2.00	4.00	1.00	0.00	5.00
31.00	H	0.00	3.00	3.00	1.00	3.00	1.00	2.00	0.00	5.00
33.00	H	0.00	0.00	3.00	2.00	3.00	1.00	2.00	0.00	5.00
34.00	H	0.00	3.00	4.00	2.00	5.00	2.00	1.00	0.00	5.00
51.00	H	0.00	0.00	3.00	2.00	1.00	5.00	1.00	0.00	2.00
38.00	H	0.00	0.00	1.00	1.00	2.00	2.00	1.00	6.00	2.00
58.00	F	0.00	0.00	3.00	2.00	2.00	1.00	1.00	0.00	7.00
52.00	F	0.00	0.00	3.00	1.00	2.00	3.00	2.00	0.00	5.00

Communities

Faculty of Biology and Medicine at University of Lausanne & Lausanne University Hospital

Remove

69 views

39 downloads

See more details...

Indexed in OpenAIRE

Publication date:
April 11, 2017

DOI:
DOI 10.5281/zenodo.520555

Keyword(s):
Suicide | Suicide attempt | Emergency unit | Phone contacts

October 25, 2022

Software Open Access

connectomicslab/connectomemapper3: Connectome Mapper v3.1.0

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Connectome Mapper 3 implements, in accordance to the BIDS-App standard, full anatomical, diffusion, and resting/state functional MRI processing pipelines, from raw T1, DWI, BOLD, and preprocessed EEG data to multi-resolution brain parcellation with corresponding connection matrices, based on a new version of the Lausanne parcellation atlas (Cammoun et al, 2012), aka Lausanne2018.

This first minor version integrates the new pipeline dedicated to EEG modality and fixes a few bugs. 😄

What's Changed

Updates

- The conda environment files (`conda/environment.yml` and `conda/environment_macosx.yml`) for `cmpbidsappmanager` have been greatly modified (PR #212).
- In all conda environment `\*.yml` and `requirements.txt` files, datalad and its container extension have been updated to version `0.17.2` and `1.1.6` respectively. (PR #209)

New features

- The new pipeline dedicated to EEG modality has been integrated into the BIDS App and `cmpbidsappmanager` . (PR #201 and PR #205)
- Option to apply or not band-pass filtering in fMRI pipeline. (PR #200)

Code refactoring

- Major refactoring of all the code related to the EEG pipeline. (PR #198)

Bug fix

- Problems to install and launch cmpbidsappmanager on Ubuntu. (PR #212)
- Fix nibabel to `3.2.2` as the imported functions of `nibabel.trackvis` has been moved since `4.0.0` and caused errors. (PR #211)
- Fix problem of traits not updated while making the diffusion pipeline config with ACT. (PR #200)

Documentation

- Update/add documentation for the EEG pipeline. (PR #208)

Software development life cycle

- Optimization of resources stored in the cache and in the workspace. (PR #201)

Communities

Faculty of Biology and Medicine at University of Lausanne & Lausanne University Hospital — Remove

1,291 views

63 downloads

See more details...

Available in GitHub

Indexed in OpenAIRE

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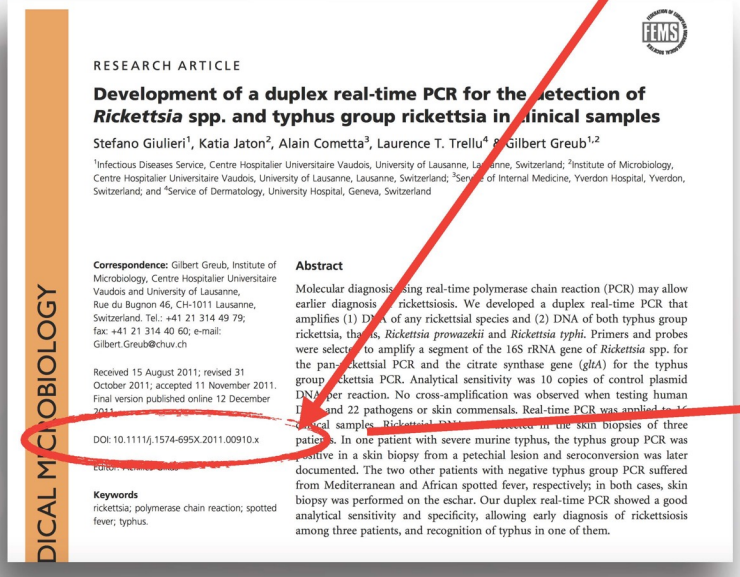

DICAL MICROBIOLOGY

RESEARCH ARTICLE

Development of a duplex real-time PCR for the detection of *Rickettsia* spp. and typhus group rickettsia in clinical samples

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Keywords
rickettsia; polymerase chain reaction; spotted fever; typhus.

Abstract

Molecular diagnosis using real-time polymerase chain reaction (PCR) may allow earlier diagnosis of rickettsiosis. We developed a duplex real-time PCR that amplifies (1) DNA of any rickettsial species and (2) DNA of both typhus group rickettsia, that is, *Rickettsia prowazekii* and *Rickettsia typhi*. Primers and probes were selected to amplify a segment of the 16S rRNA gene of *Rickettsia* spp. for the pan-rickettsial PCR and the citrate synthase gene (*gltA*) for the typhus group rickettsia PCR. Analytical sensitivity was 10 copies of control plasmid DNA per reaction. No cross-amplification was observed when testing human DNA and 22 pathogens or skin commensals. Real-time PCR was applied to 16 clinical samples. Rickettsial DNA was detected in the skin biopsies of three patients. In one patient with severe murine typhus, the typhus group PCR was positive in a skin biopsy from a petechial lesion and seroconversion was later documented. The two other patients with negative typhus group PCR suffered from Mediterranean and African spotted fever, respectively; in both cases, skin biopsy was performed on the eschar. Our duplex real-time PCR showed a good analytical sensitivity and specificity, allowing early diagnosis of rickettsiosis among three patients, and recognition of typhus in one of them.

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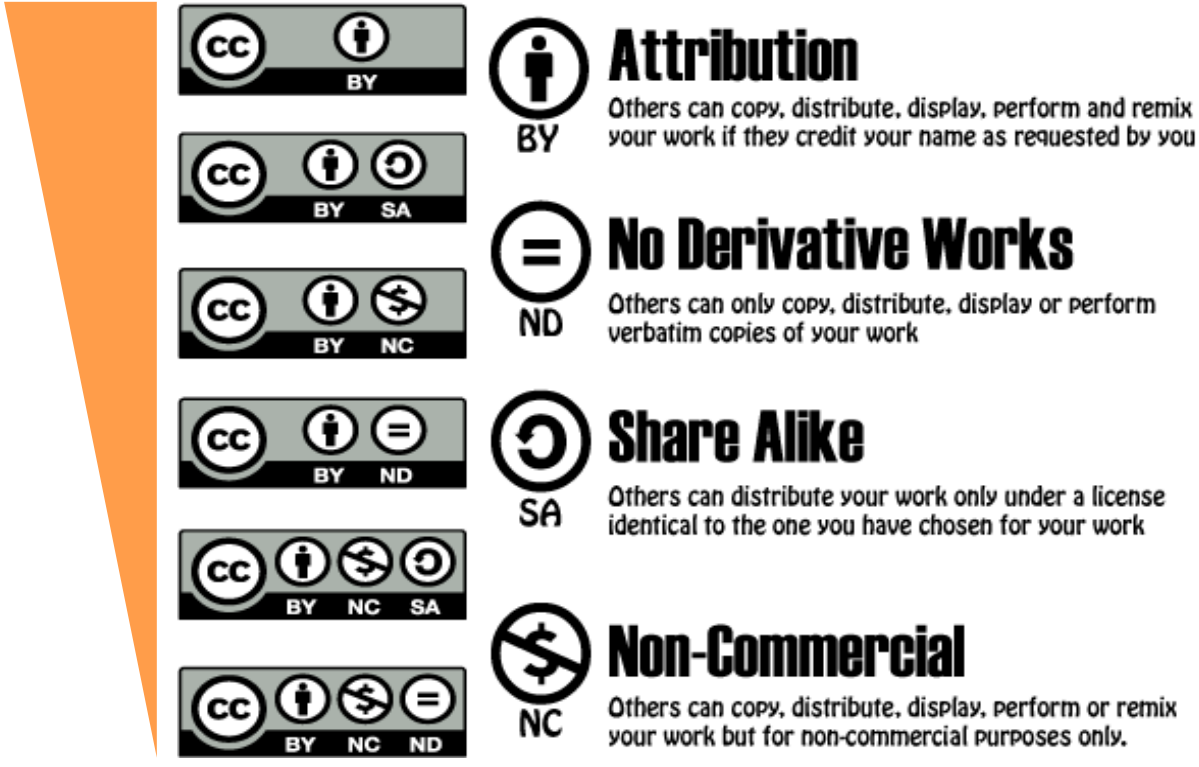

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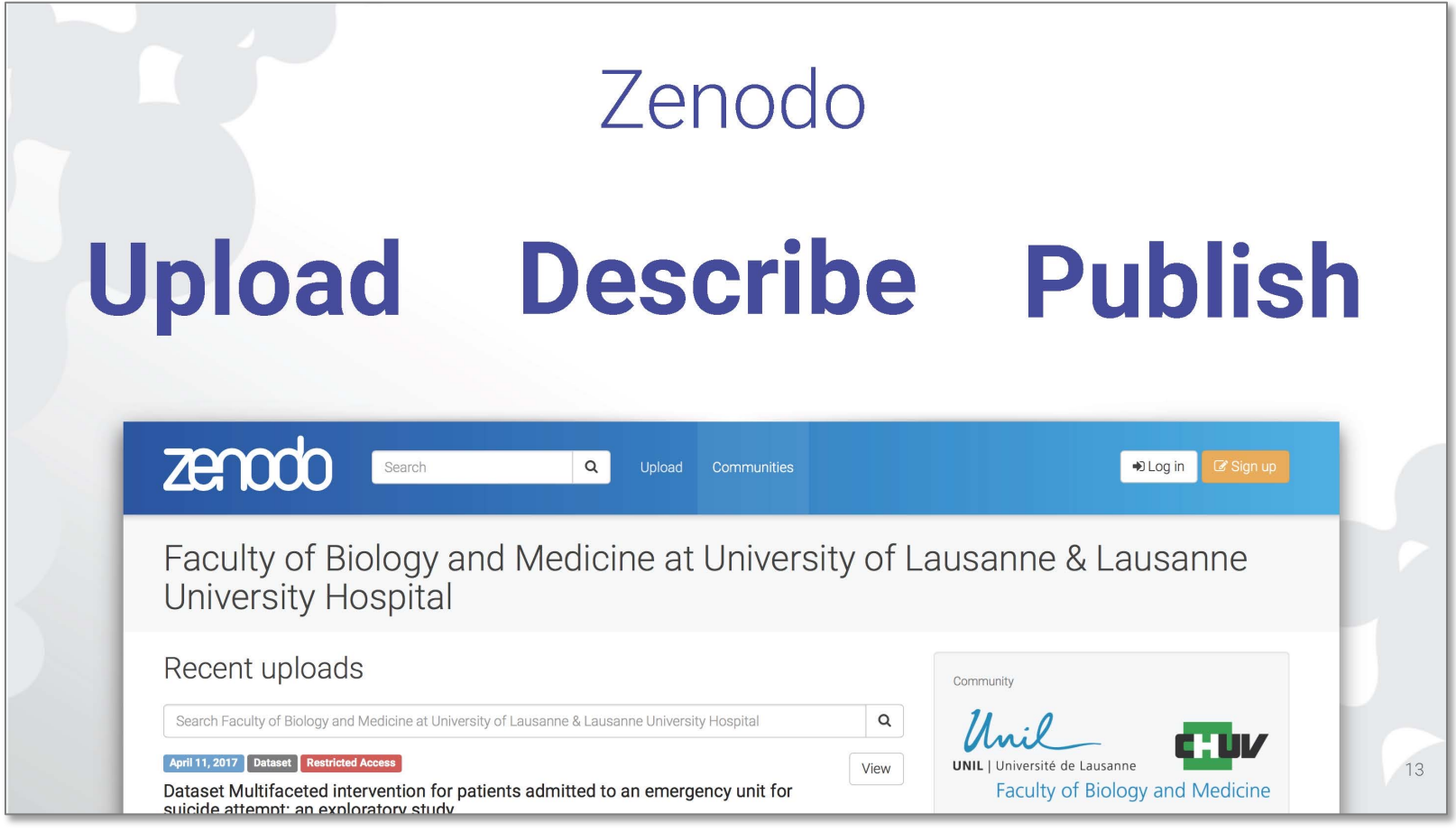

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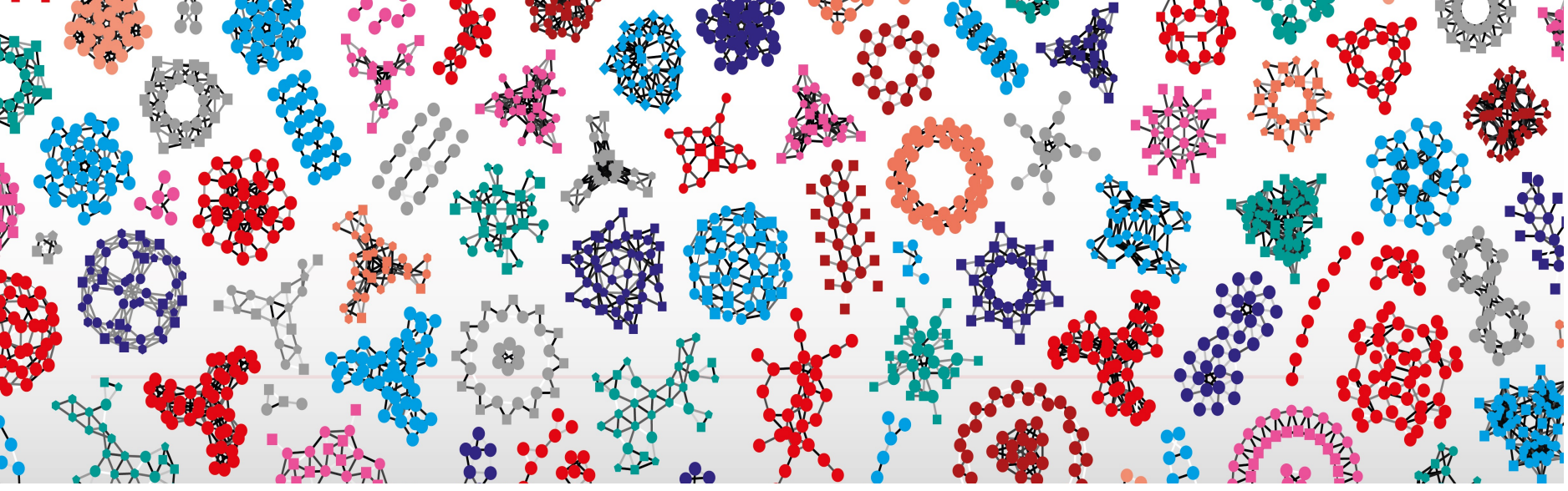

Thank you!

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