UNIVERSITY OF OSLO

Module III: Data organization, metadata, and documentation

Edina Pózer, Ivana Malovic, Agata Bochynska, Annika Rockenberger and Igor Goncharenko The University of Oslo Library



Materials developed as part of the *Skills development* project for research data:

Today's course

- One hour lecture with a short break
- Q&A session

Please feel free to write comments and questions in the Chat!



Design a data file structure

• In an early stage of your research, you are faced with the question of what form your data files should take. Your initial decision about the structure of your data files should be considered thoroughly.

 The data file structure has a huge impact on the possible ways your files can be processed and analysed and once your structure has been filled with data, any changes to it are usually laborious and time-consuming.

Create a data organising system

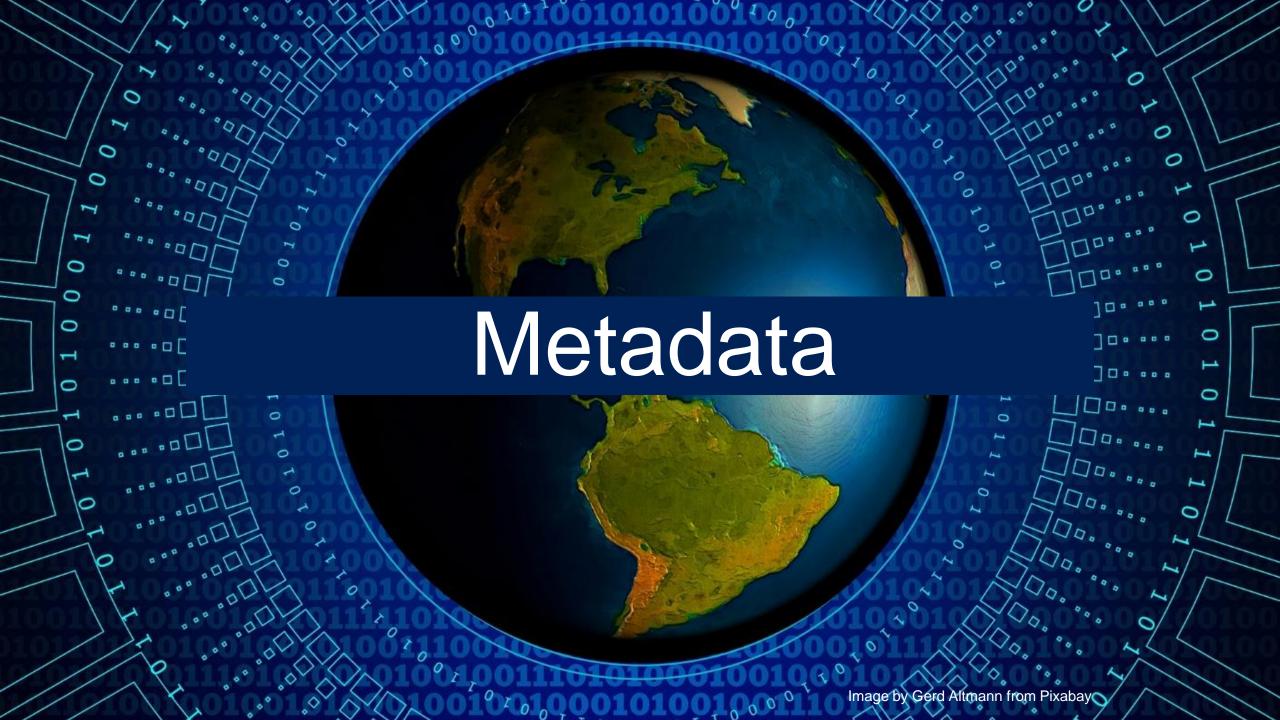
- Follow your working pattern
- Systematic and logical
- Quick and easy to navigate
- Simple enough to be used all the time
- Considered and thought through before you start (!)
- Scaleable



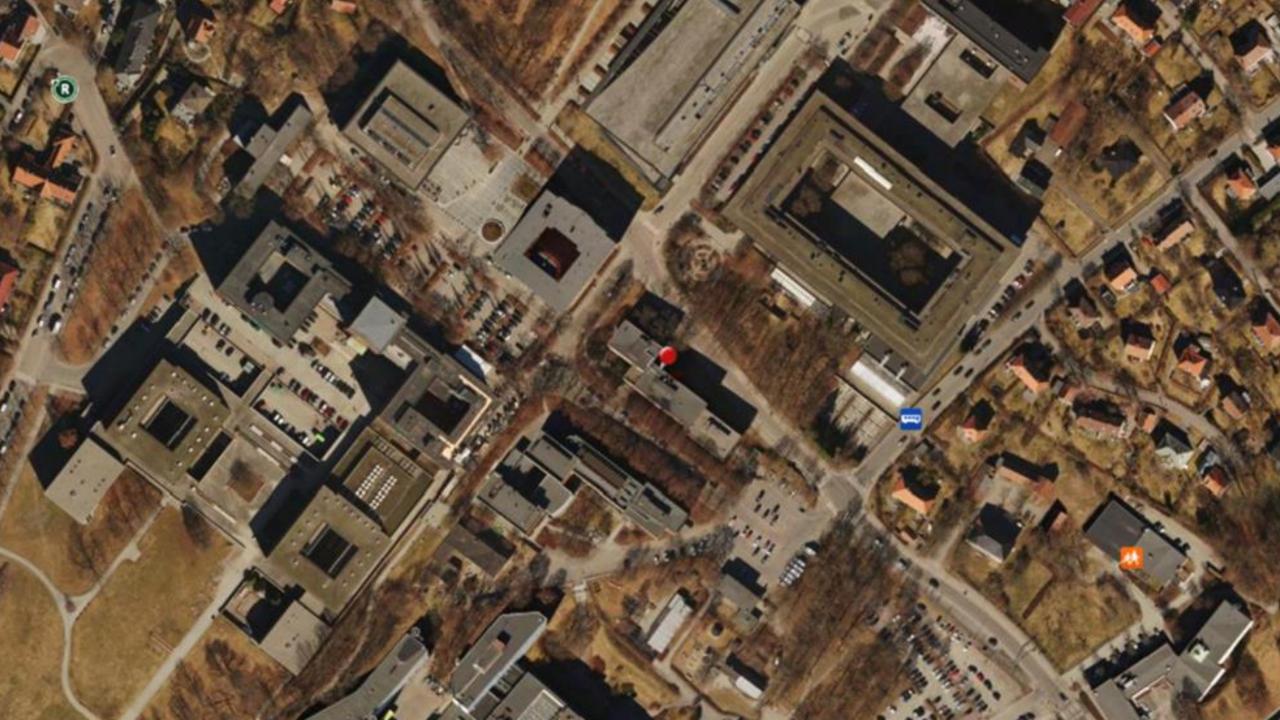
Organise your data

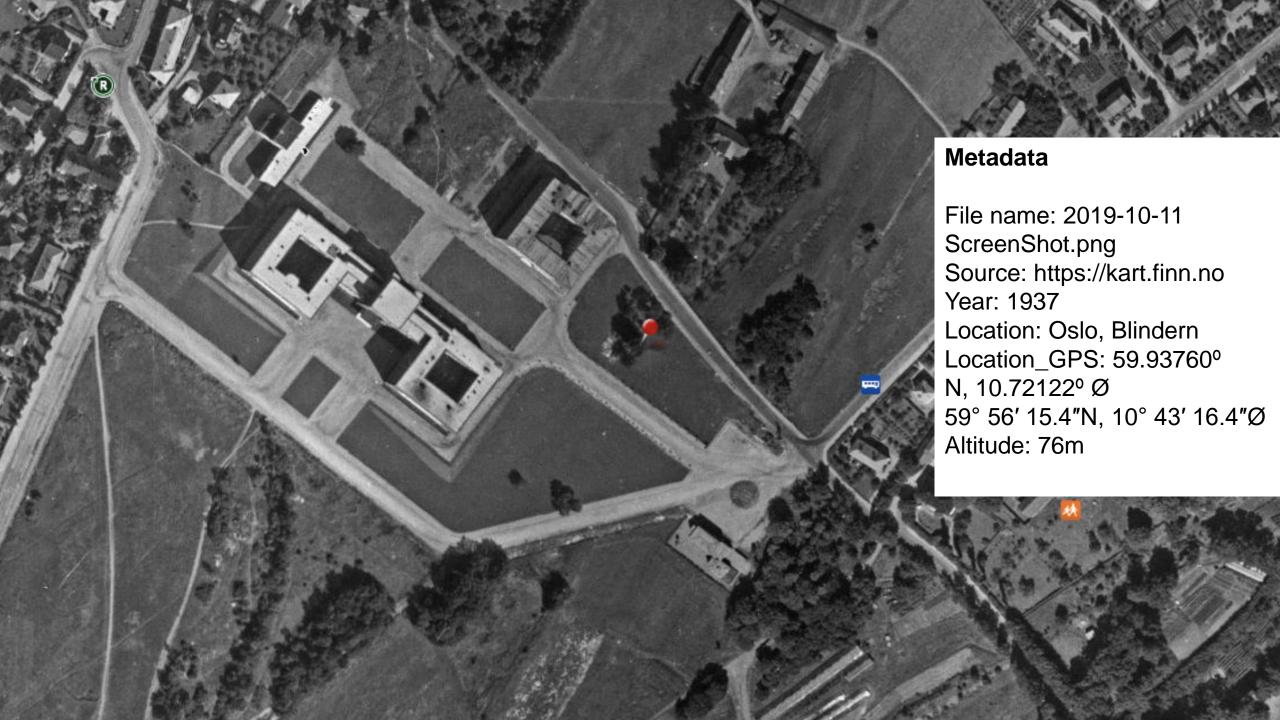
- Do not use your computer desktop as a storage place
- Make a folder hierarchy and give your folders descriptive and informative names
- Avoid folders that become too broad or general, create more subfolders instead.
- Keep active and finished parts of your project separate, and take the time to tidy once in a while











Metadata

- Metadata or "data about data" are descriptions that facilitate cataloguing data and data discovery.
- Metadata are intended for machine-reading. When data is submitted to a trusted data repository, the archive generates machine-readable metadata.
- Machine-readable metadata help to explain the purpose, origin, time, location, creator(s), term of use, and access conditions of research data
- Your discipline very likely has standards for metadata!





ALBUM

'm Your Man

Leonard Cohen • 1988 • 8 songs, 40 min 48 sec





TITLE

First We Take Manhattan

Ain't No Cure for Love Leonard Cohen

Leonard Cohen

6:00

4:49

Types of metadata

Descriptive metadata	For finding or understanding a resource
Administrative metadata - Technical metadata - Preservation metadata - Rights metadata	 For decoding and rendering files Long-term management of files Intellectual property rights attached to content
Structural metadata	Relationships of parts of resources to one another
Markup languages	Integrates metadata and flags for other structural or semantic features within content

Why do we need metadata?

- Discovery
- Aid in identification or understanding of a resource
- Interoperability
- Digital object management
- Preservation
- Navigation within parts of items
- A huge help when making data FAIR!



Findable Accessible Interoperable Reusable

The Accessible Interoperable Reusable

The Accessible Interoperable Reusable Reusable

Dublin Core Metadata Element Set - a set of fifteen "core" elements (properties) for describing resources

Dublin Core Metadata Element Set

- **01. Contributor** "An entity responsible for making contributions to the resource."
- **02. Coverage** "The spatial or temporal topic of the resource, the spatial applicability of the resource, or the jurisdiction under which the resource is relevant."
- **03.** Creator "An entity primarily responsible for making the resource."
- **04.** Date "A point or period of time associated with an event in the lifecycle of the resource."
- **05. Description** "An account of the resource."
- **06. Format** "The file format, physical medium, or dimensions of the resource."
- 07. Identifier "An unambiguous reference to the resource within a given context."
- **08.** Language "A language of the resource."
- **09.** Publisher "An entity responsible for making the resource available."
- **10. Relation** "A related resource."
- 11. Rights "Information about rights held in and over the resource."
- **12. Source** "A related resource from which the described resource is derived."
- **13.** Subject "The topic of the resource."
- **14. Title** "A name given to the resource."
- **15. Type** "The nature or genre of the resource."

Darwin Core - extension of Dublin Core meant to provide a stable standard reference for sharing information on biological diversity

Figure 2. Darwin Core Categories: Simple Darwin Core is comprised of seven categories of terms (green).

Show in Context

Download:

PPT

PNG

This subset of Darwin Core terms represents descriptive data about organisms that can be represented in one file with one row... show more >









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Search -

Deposit Guide

Support

DataverseNO > Replication data for: "Early Cenozoic Eurekan strain partitioning and decoupling in central Spitsbergen, Svalbard"





Replication data for: "Early Cenozoic Eurekan strain partitioning and decoupling in central Spitsbergen, Svalbard"

Version 1.1

Koehl, Jean-Baptiste, 2021, "Replication data for: "Early Cenozoic Eurekan strain partitioning and decoupling in central Spitsbergen, Svalbard"", https://doi.org/10.18710/IIHGSH, DataverseNO, V1

■ Cite Dataset ▼

Learn about Data Citation Standards.

Dataset Metrics ②

0 Downloads ②

Description

High-resolution versions of the figures and supplements of the Koehl (2020) manuscript entitled "Early Cenozoic Eurekan strain partitioning and decoupling in central Spitsbergen, Svalbard", which could not be attached to the manuscript itself due to size limit but that are necessary to identify the main structures and interpretation. (2021-04-07)

Subject 🕣

Earth and Environmental Sciences

Keyword @

Faults, Tectonics, High-resolution figures, Svalbard, Eurekan, Billefjorden Group, Strain partitioning, Bedding-parallel thrust,

Décollement and duplexes

Related Publication (

Koehl, J.-B. P.: Early Cenozoic Eurekan strain partitioning and decoupling in central Spitsbergen, Svalbard, Solid Earth, 12, 2021.

Files

Metadata

Terms

Versions

https://dataverse.no/dataset.xhtml?persistentId=doi:10.18710/IIHGSH











Search -

Deposit Guide

Support

Citation Metadata ^

Dataset Persistent ID 🕣 doi:10.18710/IIHGSH

Publication Date 2021-04-07

Title 🕣 Replication data for: "Early Cenozoic Eurekan strain partitioning and decoupling in central Spitsbergen, Svalbard"

Author Koehl, Jean-Baptiste (University of Oslo) - ORCID: 0000-0001-7189-1988

Contact 🕣 Use email button above to contact.

Koehl, Jean-Baptiste P. (University of Oslo)

Description (High-resolution versions of the figures and supplements of the Koehl (2020) manuscript entitled "Early Cenozoic Eurekan strain

partitioning and decoupling in central Spitsbergen, Svalbard", which could not be attached to the manuscript itself due to size limit

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Tectonics

High-resolution figures

Svalbard

Eurekan

Billefjorden Group

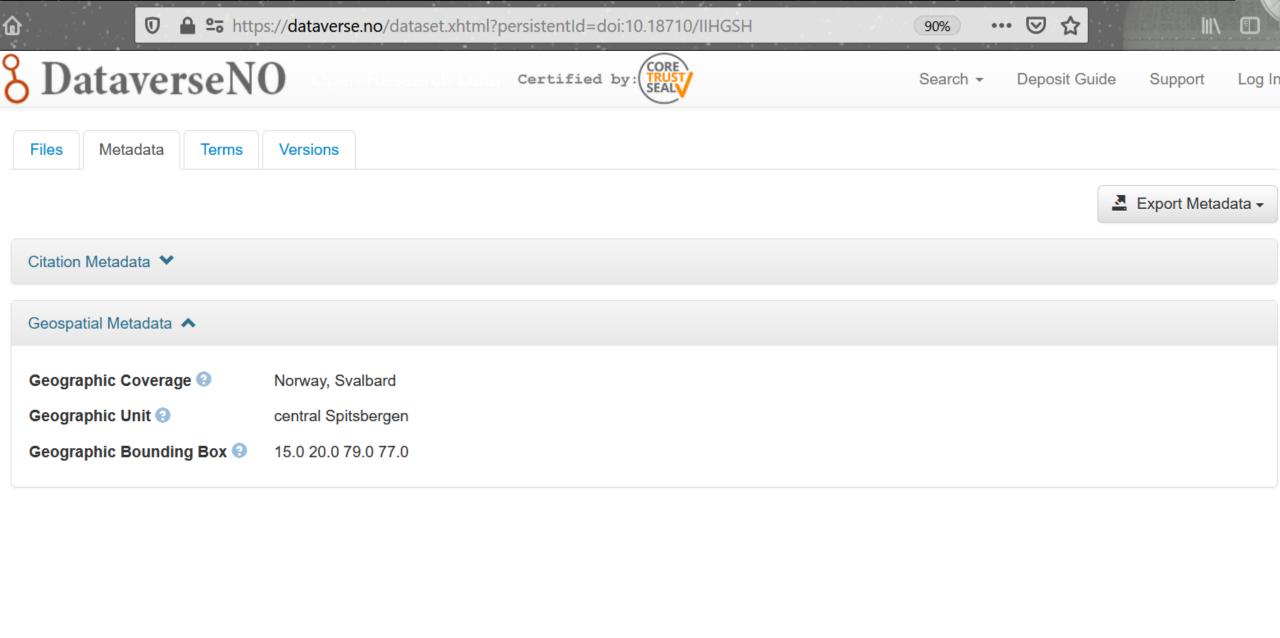
Strain partitioning

Bedding-parallel thrust

Décollement and duplexes

Related Publication (

Koehl, J.-B. P.: Early Cenozoic Eurekan strain partitioning and decoupling in central Spitsbergen, Svalbard, Solid Earth, 12, 2021.



Dataverse –deposit your data

Enter metadata

Information about the various metadata fields can be obtained by placing the cursor on the field names (a roll-over window appears).

Here is some more information about some of the fields:

→ Title:

- Enter a title for your dataset.
- → If your dataset is used in a publication, you may enter the title of the publication, and click on Add "Replication Data for" to Title.

Author:

→ Enter your name as you use it in your publications. We recommend you to add your affiliation as well. For entering co-authors, click on the plus button. We also recommend you to add your ORCID (https://orcid.org).

Contact:

→ Enter a contact email address. Also add the name of the contact person or research group/institution.

Description:

- Enter information about the data to be uploaded. Avoid using certain HTML tags and other special characters (e.g. [or]). If you need to add paragraphs, add the HTML tags and around each paragraph.
- If relevant, enter information about the data collection/methodology here.
- → If applicable, also enter the publication abstract. The abstract should be entered into a second description field, which can be added by clicking the plus button to the right. NB! If your article is only submitted and not accepted (yet), DO NOT mention the name of the journal it has been submitted to.



Dataverse –deposit your data

→ Keyword:

- Information such as the subject area(s) (e.g. morphology or zoology) and the statistical method(s) may be entered into the keyword field.
- Each keyword needs to be entered separately. Please click the plus button to enter more keywords.
- Vocabulary and Vocabulary URL are not mandatory and may be left empty.

→ Related Publication:

- If the files you are depositing are the background data for a publication, you should include a reference to the publication here.
- Note! If your manuscript has been submitted for review but has not yet been accepted, DO NOT list the name of the journal or publisher. Instead you may simply write "Submitted for review" or similar.
- → **Note!** If the review of your manuscript is going to be double blind (both author and reviewer are anonymous), you must add a note about it in the *Related Publication* field. This way, the curators can assist you in anonymizing the dataset.
- (When adding more than one publication, only the first of them will be visible on the overview page of the dataset. If you don't want to highlight any of the publications in this way, you may add the following text in the first publication field: "Click Metadata tab

Data Documentation Initiative (DDI) standard

- An international standard for describing the data produced by observational methods in the social, behavioural, economic, and health sciences
- Expressed in XML
- Supports the entire research data lifecycle:
 - For a single data set: DDI Codebook
 - For a longitudinal, linked and other complex datasets: **DDI Lifecycle**
- Common fields include: Title, Alternate Title, Principal Investigator, Funding, Bibliographic Citation, Series Information, Summary, Subject Terms, Geographic Coverage, Time Period, Date of Collection, Unit of Observation, Universe, Data Type, Sampling, Weights, Mode of Collection, Response Rates, Extent of Processing, Restrictions, Version History

Organise-Document/Documentation-and-metadata

DDI standard: Example

(Borrowed from CESSDA Data Management Expert Guide)

A dataset in the Finnish Social Science Data Archive (Galanakis, Michail (University of Helsinki): Intercultural Urban Public Space in Toronto 2011-2013 [dataset]. Version 1.0 (2014-02-13). Finnish Social Science Data Archive [distributor]. http://urn.fi/urn:nbn:fi:fsd:T- FSD2926).

https://services.fsd.tuni.fi/catalogue/FSD2926?tab= summary&lang=en&study language=en Check: «Detailed description»

The machine-readable XML file looks like this:

https://services.fsd.tuni.fi/catalogue/FSD2926/DDI/ FSD2926e.xml





Metadata record is licensed under a Creative Commons Attribution 4.0 International license

Aila Data Search Help

Suomeksi Hello visitor! Login Register

♠ / Data catalogue / FSD2926 Display study description in English V FSD2926 Intercultural Urban Public Space in Toronto 2011-2013 Detailed description Questions Publications Download data · Galanakis, Michail (University of Helsinki) The dataset is (B) available for research. teaching and study. Keywords citizen participation, communities, cultural interaction, cultural Download the data pluralism, decision-making, ethnic groups, immigration, politicians, public spaces, services for young people, social inequality, urban Study description in other languages development, urban environment, urban sociology, urban spaces · in Finnish Related files The dataset contains transcripts of interviews conducted mainly in · Data example (PDF file, in English) Toronto, Canada, during 2011 and 2012. A few interviews were · Dataset guide (PDF file, in English) conducted in Vancouver and Guelph as well. The main themes of the interviews were multiculturalism, interculturalism, diversity and public space, and how the participants' perceptions of interculturalism and public space. The interviewees were professionally or voluntarily involved in the physical or social planning process, in providing services for youth, or in dealing with managing diversity (in policy-making, planning, arts etc). They were community activitsts, professional designers, managers of public spaces, social services providers, or young persons who represented the users of services aimed at communities The interviews were reflective, and questions asked changed according to what the interviewees talked about. The three main research questions were what the participants considered public spaces to be, how they defined interculturalism and, for expert interviews, how they planned/designed for diversity. Toronto is a very multicultural city, and one of the main aims of the study was to learn how Toronto's public space is managed and how public space could be used more creatively for the benefit of diverse groups. Other topics that came up included exclusion of youth, crime, services and facilities for youth, social and educational inequality, unemployment, public transport, street art, safety, police harassment, and privatization of public space. In addition to 25 one- and two-person interviews, there was one focus group interview of 13 young men and women. Interviewee age ranged from adolescents to senior citizens. Background variables included the interviewee's occupation, gender and age. Permanent link to this dataset http://urn.fi/urn:nbn:fi:fsd:T-FSD2926 Direct link to this tab: https://services.fsd.tuni.fi/catalogue/FSD2926?tab=summary&lang=en&study_language=er Study description in machine readable DDI 2.0 format

Metadata standards overviews

- The Digital Curation Center: https://www.dcc.ac.uk/guidance/standards/metadata
- Research Data Alliance Metadata Directory:
 https://rd-alliance.github.io/metadata-directory/standards/

Metadata is still work-in-progress!

Design a data file structure

 An important part of the metadata is often embedded into the data file, e.g. variable names and variable or value labels.
 Therefore, the structure of your data also contributes to the clarity of your data documentation.



Documentation vs. metadata?

"While data documentation is meant to be read and understood by humans, metadata (which are sometimes a part of the documentation) are primarily meant to be processed by machines."

Documentation: what, why and how?

What documentation?

Why documentation?

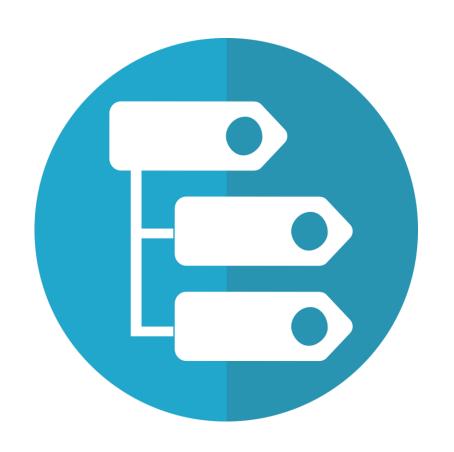
How to create documentation?

What documentation?

- Systematically documented research data is key to making the data publishable, discoverable, citable, and reusable (and FAIR)
- Clear and detailed documentation improve the overall data quality
- It is vital to document both the study for which the data has been collected and the data itself. These two levels of documentation are called project-level and data-level documentation

What documentation?

- The **project-level documentation** explains the aims of the study, what the research questions/hypotheses are, what methodologies were being used, what instruments and measures were being used, etc.
- Data-level or object-level documentation provides information at the level of individual objects such as images or variables in a database/table or transcripts, etc.
- It's become a convention to create multiple **README-files**, both for project-level documentation and for data-level documentation



Project level

General information about the project
Hypotheses
Methods for collecting and analyzing the data

File or folder level

Folder system

Version control

Lists of files and how they were obtained

List of samples?

Explanation of scripts and sets of programs written

(Naming convention for files)

Variable or experiment level

Description of each variable, with units

Document everything your data has been through

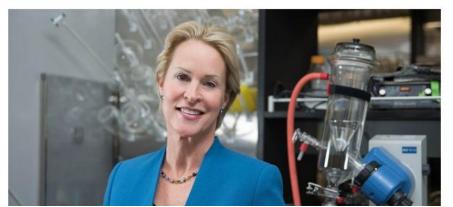
- Field journal
- Lab journals and experimental protocols
- Scripts for analysis
- Questionnaires, codebooks, data dictionaries
- Software syntax and output files
- Methodology reports
- Geolocation, orientation (e.g. when collecting a sample)
- Instrument settings and calibration



Why documentation?

Helps others understand your project and reuse your data





"It has been retracted because the results were not reproducible, and the authors found data missing from a lab notebook."

Why documentation?

- Helps others understand your project and reuse your data
 - all you need to know about your data
 - all your collaborators need to know about your data
 - all you need to know about your collaborators data
 - all anyone else who wants to work with your data needs to know about it
 - more information is better than less
 - structured information is better than unstructured information
 - no documentation is the worst!
 - start early, save time & have less stress
 - re-use templates for good documentation, READMEs, etc.
 - you must have documentation when you archive your data

How to create documentation?

README.txt-files:

- Announce that they are the first file to open when looking through your old data
- Provide a map for exploring your files
- Create one README.txt file per folder in as many folders as you can
- They do not need to be large, but their content should help navigation through digital files and folders
- a project-level README.txt should give the general project information and a very coarse overview of file contents and locations
- A data-(object-) level README.txt would be more specific as to what each file contains

How to create documentation?

Cornell University template and guide README.txt-files:

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

README.txt-files: some examples

https://dataverse.no/dataset.xhtml?persistentId=doi:10.18710/LNCK8O

https://dataverse.no/dataset.xhtml?persistentId=doi:10.18710/Q3FZAN

https://dataverse.no/dataset.xhtml?persistentId=doi:10.18710/TYPJXU

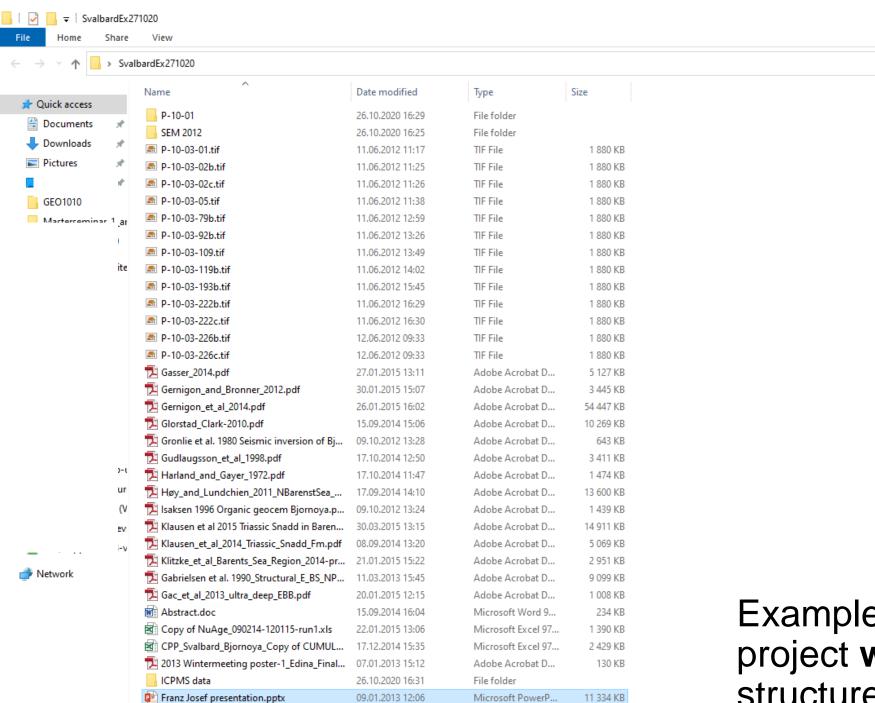




File naming & Folder structure

• Structuring your data files in folders is important for making it easier to **locate** and **organise** files and versions. A proper folder structure is especially needed when collaborating with others.

 The decision on how to organise your data files depends on the plan and organisation of the study. All material relevant to the data should be entered into the data folders, including detailed information on the data collection and data processing procedures.



Example of a research project **without** data file structure – Edina Pózer ©

How it could look like:

```
project_name/
  — README.md # overview of the project
  - data/ # data files used in the project
       README.md # describes where data came from
    └─ sub-folder/ # may contain subdirectories
  - processed_data/ # intermediate files from the analysis
 - manuscript/ # manuscript describing the results
- results/ # results of the analysis (data, tables, figures)
          # contains all code in the project
  - src/
      - LICENSE # license for your code
     — requirements.txt # software requirements and dependencies
                       # documentation for your project
   doc/
      - index.rst
```

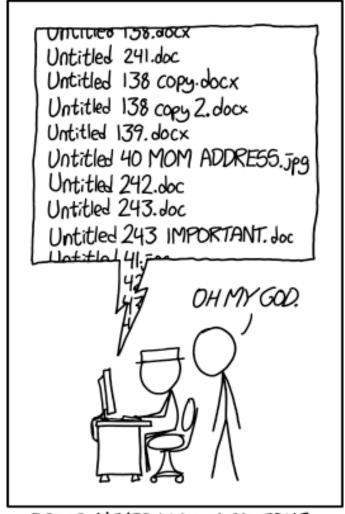
Research project with a proper data file structure. Image taken from CodeRefinery, Lesson on Reproducible Research. Shared under CC-BY 4.0.



Naming conventions

- Short names (but long enough that they still make sense)
- The most general information first, then add details to the name
- Underscore to separate words, DO NOT use space in file names!
- Dates backwards (YYYYMMDD)
- Numbers (e.g. version number) should have the same number of digits, use e.g. 01, not just 1.
- Version number at the end





PROTIP: NEVER LOOK IN SOMEONE. ELSE'S DOCUMENTS FOLDER.

Avoid using the following characters in Folder and File names:

- # pound
- % percent
- & ampersand
- \ back slash
- \$ dollar sign
- ! exclamation point

- < left angle bracket
- > right angle bracket
- / forward slash
 - blank spaces
- ' single quotes
- " double quotes

- { left curly bracket
- } right curly bracket
- * asterisk
- ? question mark
- = equal sign



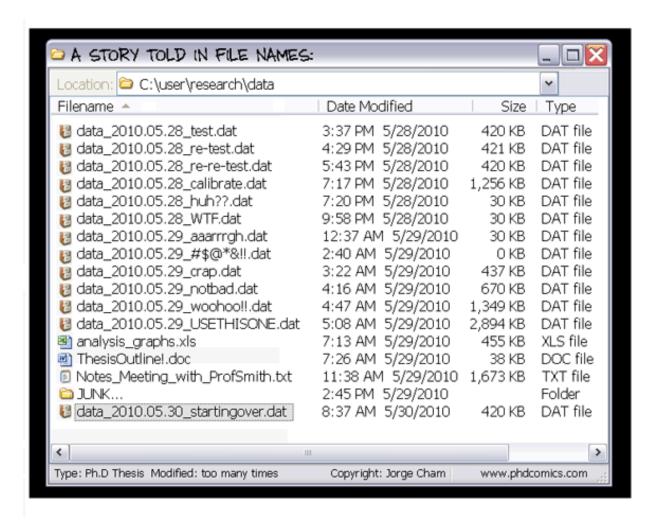
Also, keep these rules in mind:

 Don't start or end your filename with a space, period, hyphen, or underline

Keep your filenames to a reasonable length

 Most operating systems are case sensitive; always use lowercase

Tidy every once in a while



Version control system

- Perfect for collaboration
- Tracking and managing changes to a file or set of files over time.
- You will be able to recall any version at any time.
- It can be used for documents, software development, large websites etc.

Version control

 Git: Free and open source version control system

 GitHub: is an internet hosting service for software development and version control using Git



Sustainable file formats

When your project is finished and you plan on archiving your data, it
is widely recommended to transfer data and accompanying files
into a more sustainable format.

 Trusted data archives often have guidelines for this, e.g. the recommendations of Data Archiving and Networked Services (DANS)

Improve the following file names

- enter suggestions in the chat

Tech & Admin Costs.xls

Image.3.png

Article-revised-by-NN-Thursday.docx



Improve the following file names

-enter suggestions in the chat

Tech & Admin Costs.xls

TechAdminCost2021.xls or tech_admin_cost_2021.xls etc.

Image.3.png

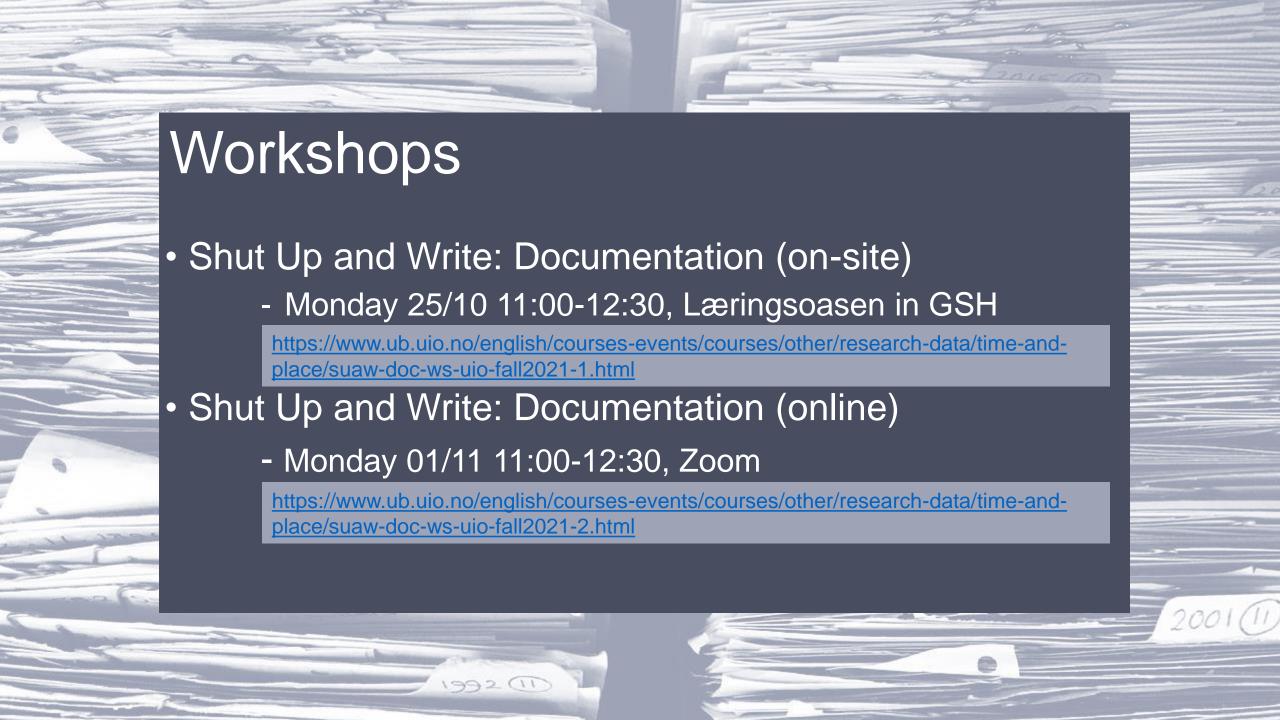
nameimage003samplexy.png or sem_zircon003_epb1219.png etc.

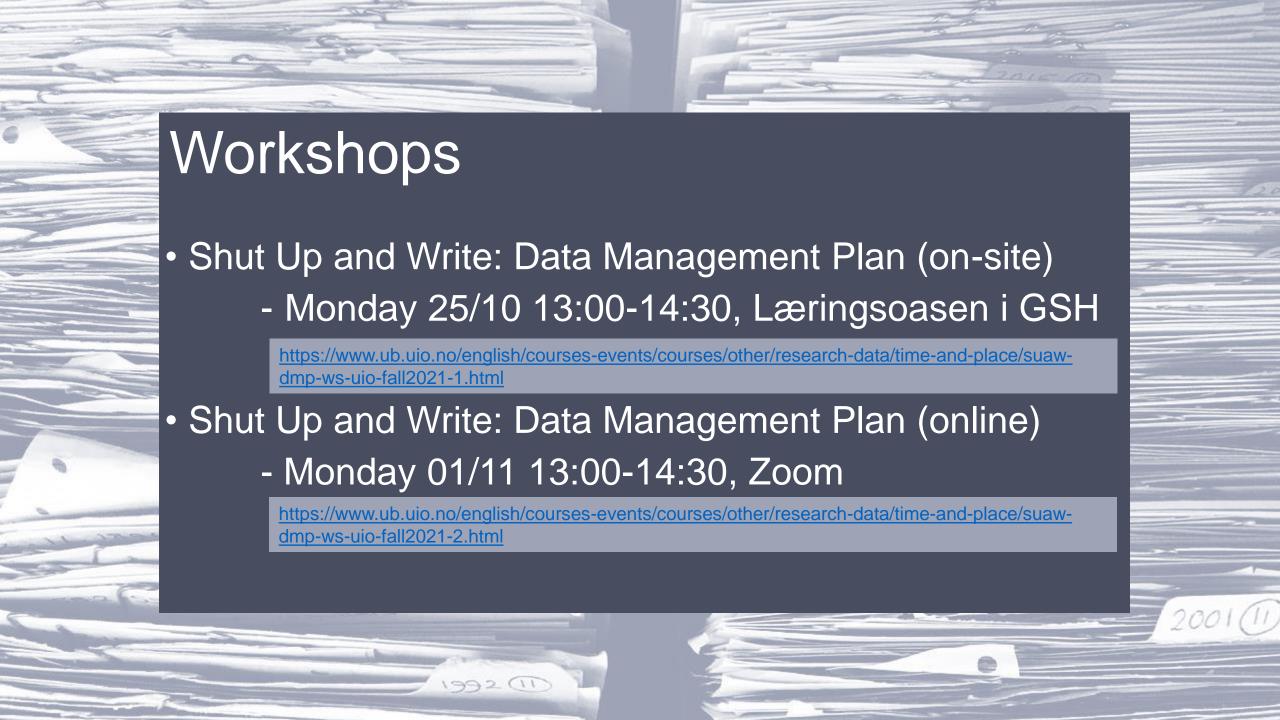
Article-revised-by-NN-Thursday.docx

NNova_revised_101021.docx or nnova_20211010_v07.docx etc.









Open Science Lunch 2021 Organized by Digital Scholarship Center and Open Research

Organized by **Digital Scholarship Center** and **Open Research University of Oslo Library**

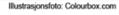
Each last Thursday of the month at 12.00 we invite you to join us virtually for an online open lunch to hear about how to make your research more open.

August 26th Agata Bochynska The benefits of preregistering your research

September 30th Daniel Kalvø A short guide to Plan S

October 28th
Ivana Malovic
Open your research with ORCID

November 25th
Elin Stangeland
Open and FAIR data









Open Access Week 2021

Join us for a series of national and local events during the Open Access Week and learn about open research, open publishing, and data sharing!

Time: Oct. 25, 2021 9:00 AM-Oct. 29, 2021 4:00 PM

https://www.ub.uio.no/english/courses-events/events/all-libraries/2021/open-access-week-2021.html



National Open Access Week events

Monday 25th - Friday 29th October

As part of this year's Open Access Week, several Norwegian academic libraries, together with RDA (Research Data Alliance) Norway and ELIXIR Norway, present a series of events with topics related to open publishing, open science and data sharing. All events are digital and are open to anyone interested.

Here you can find the full program for the national Open Access Week events in Norway and register for each weblnar.

Local events at the University of Oslo

Monday 25th October

11:00-12:30: Shut Up and Write: Documentation (on-site)

is it difficult to set aside time to write proper documentation for your data collection? We offer a structured information and writing session for you!

13:00-14:30: Shut Up and Write: Data Management Plan (on-site)

is it difficult to set aside time to write proper Data Management Plan for your research project? We offer a structured information and writing session for you!

Tuesday 26th October

13:00-14:30: Sharing and archiving research data

Are you keen on sharing your research data? Or does your publisher or funder require that your dataset is available? In this course we will introduce you to data sharing and how to do it yourself. The course is a part of a series of research data management courses.

Wednesday 27th October

13:00-14:30: Data discovery and reuse

There are lots of data out there to discover and reuse. In this course we will introduce you to the concept of data discovery and show you the basics on how to work with secondary data. The course is a part of a series of research data management courses

Thursday 28th October

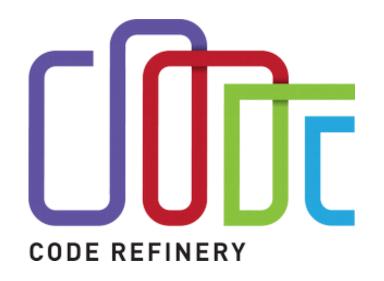
12:00-13:00: Open Science Lunch: Open your research with ORCID

Join us for our monthly online Open Science Lunch and learn about what ORCID is and how it can help make your research more open. Read more about Open Science Lunch series and upcoming events here.

14:00-15:00: ReproducibiliTea Journal Club. Join us for our bi-weekly, online discussion of articles about open science practices, research reproducibility and meta-research. You can sign up for our mailing list to receive regular updates or get in touch directly if you have any questions.

Skills development at UiO





Carpentries

www.uio.no/carpentry

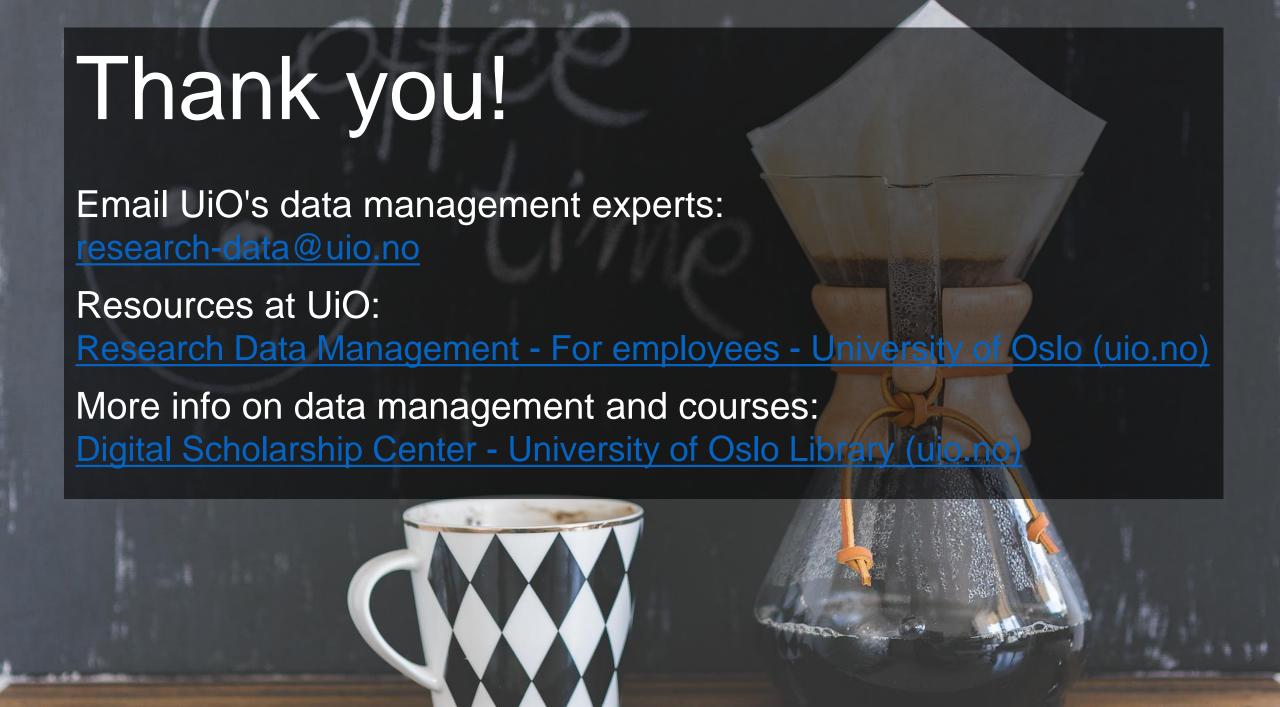
CodeRefinery

https://coderefinery.org/

UiOs Digital Scholarship Center

https://www.ub.uio.no/english/writing-publishing/dsc/





Sources

- Deutz DB, Buss MCH, Hansen JS, Hansen KK, Kjelmann KG, Larsen AV, Vlachos E, Holmstrand KF (2020). How to FAIR: a Danish website to guide researchers on making research data more FAIR. https://howtofair.dk/how-to-fair/
- CESSDA Training Team (2017 2020). CESSDA Data Management Expert Guide. Bergen, Norway: CESSDA ERIC. Retrieved from https://www.cessda.eu/DMGuide
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- K. Briney (2014) Wrapping Up A Project. Retrieved from: http://dataabinitio.com/?p=344
- Guide to writing "readme" style metadata by the Research Data management Service Group, Cornell University.
 Retrieved from: https://data.research.cornell.edu/content/readme
]
- Riley J (2017). *Understanding Metadata: What is Metadata, and What is it For?: A Primer*. National Information Standards Organization (NISO). https://www.niso.org/publications/understanding-metadata-2017
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- Wieczorek J, Bloom D, Guralnick R, Blum S, Döring M, Giovanni R, et al. (2012) Darwin Core: An Evolving Community-Developed Biodiversity Data Standard. PLoS ONE 7(1): e29715. https://doi.org/10.1371/journal.pone.0029715
- Data Archiving and Networked Services (DANS). *File formats*. Retrieved from: https://dans.knaw.nl/en/about/services/easy/information-about-depositing-data/before-depositing/file-formats