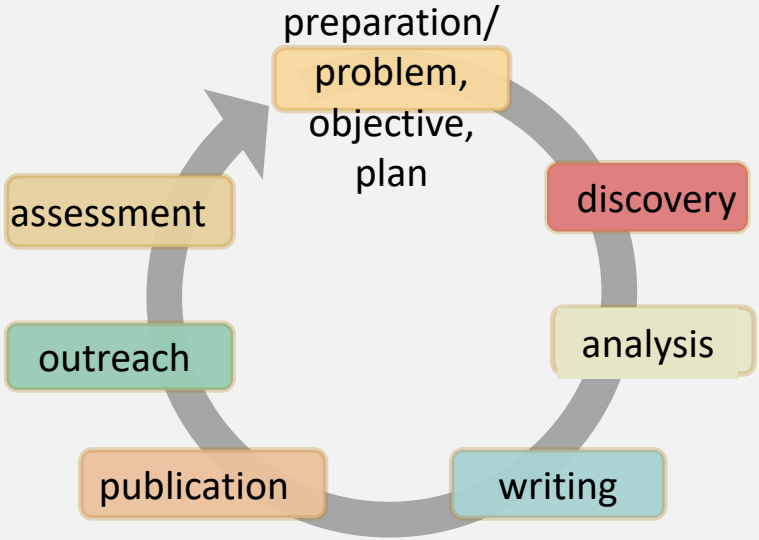
The What, Why and How of Data Management Planning

Iryna Kuchma, EIFL Open Access Programme Manager, @irynakuchma

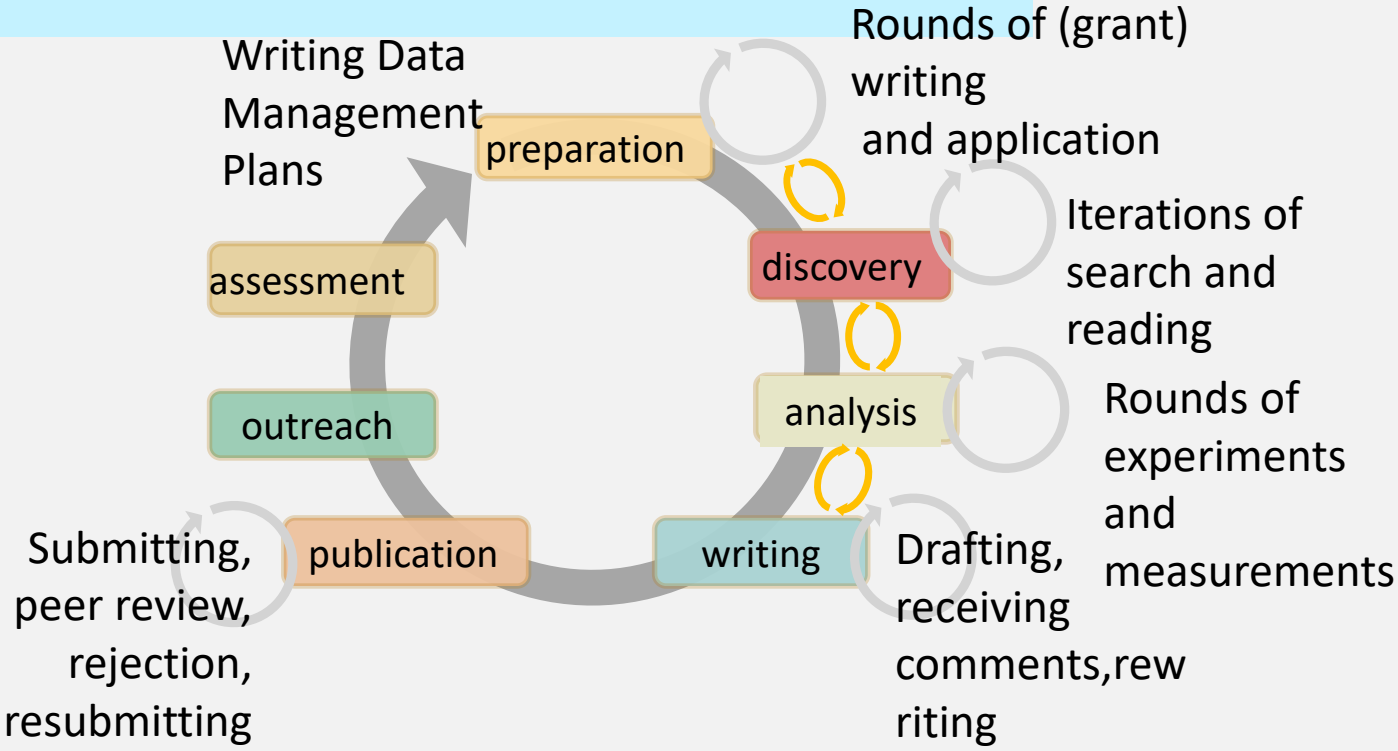
Seminar for young researchers in SSH on Open Science and Data Management, EKT

5th June 2018

A model of the research workflow

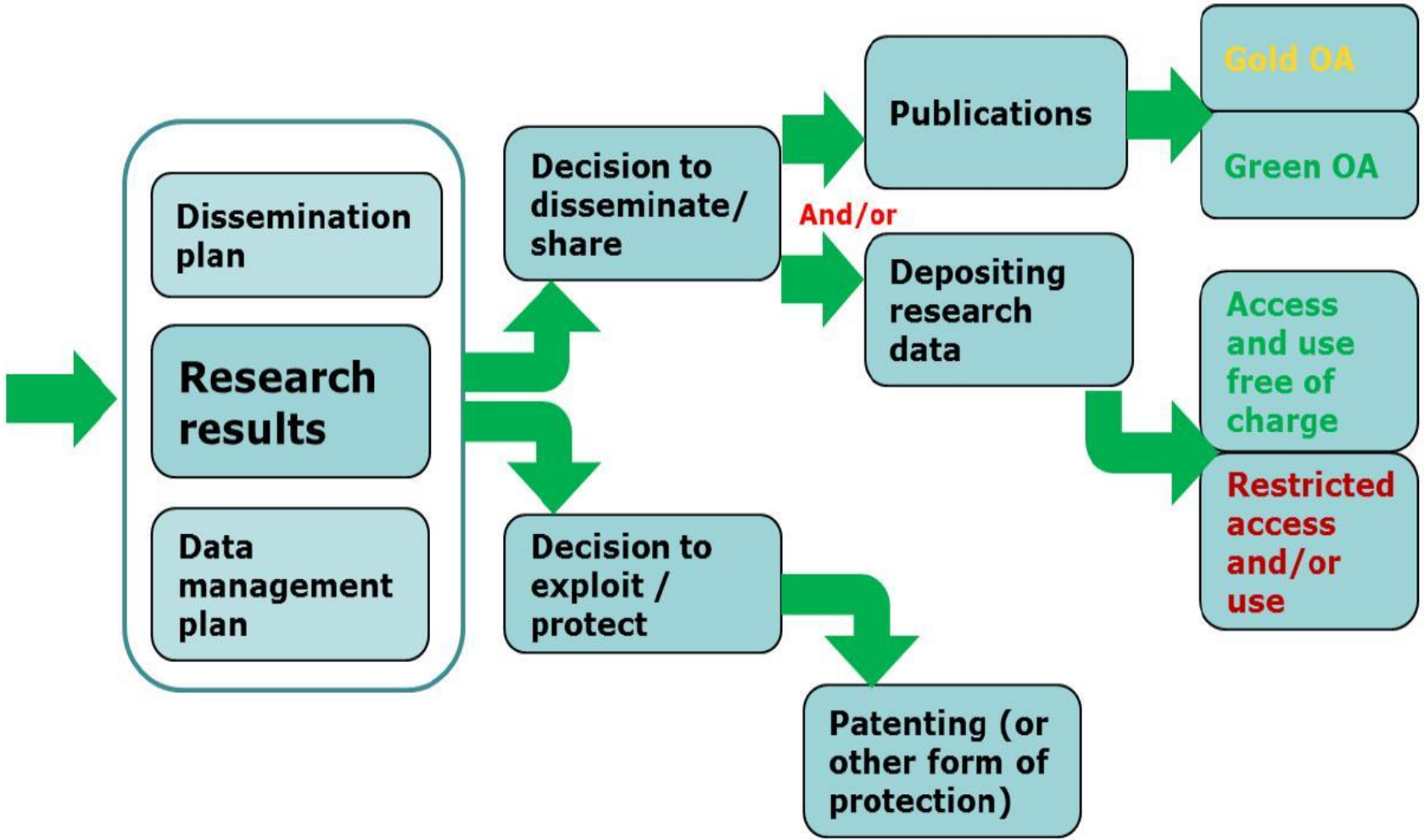


A model of the research workflow



Disciplinary variety and Open Science

	ARTS & HUMANITIES	SOCIAL SCIENCE	LIFE/HEALTH	PHYSICAL SCIENCES
Research types	often exploratory research	often confirmatory research	often confirmatory research	often confirmatory research?
Data	often texual data	also qualitative data, sometimes sensitive data	sensitive patient data / big datasets	big datasets
Publ. Types	books, chapters, articles	mostly articles and chapters	mostly articles, (syst.) reviews	preprints, conf papers, articles
Collaboration	typically 1	typically 1-4	typically 3-10	typically 3-many
Languages	native languge & some English	English, some native languages	English	English
Funding	small scale funding	small & medium scale funding	large scale funding	large scale funding
Review	double blind	double + single blind	single blind	single blind


Research
Dissemination plan
Research results
Data management plan
Decision to disseminate/ share
Decision to exploit / protect
Publications
And/or
Depositing research data
Gold OA
Green OA
Access and use free of charge
Restricted access and/or use
Patenting (or other form of protection)

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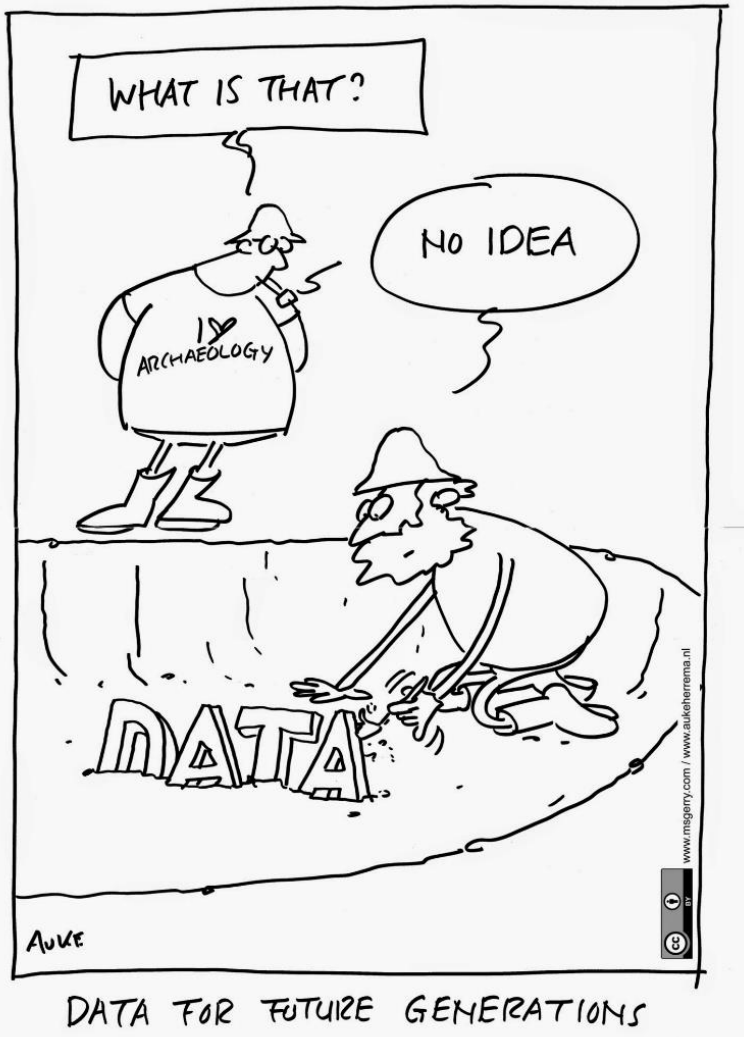
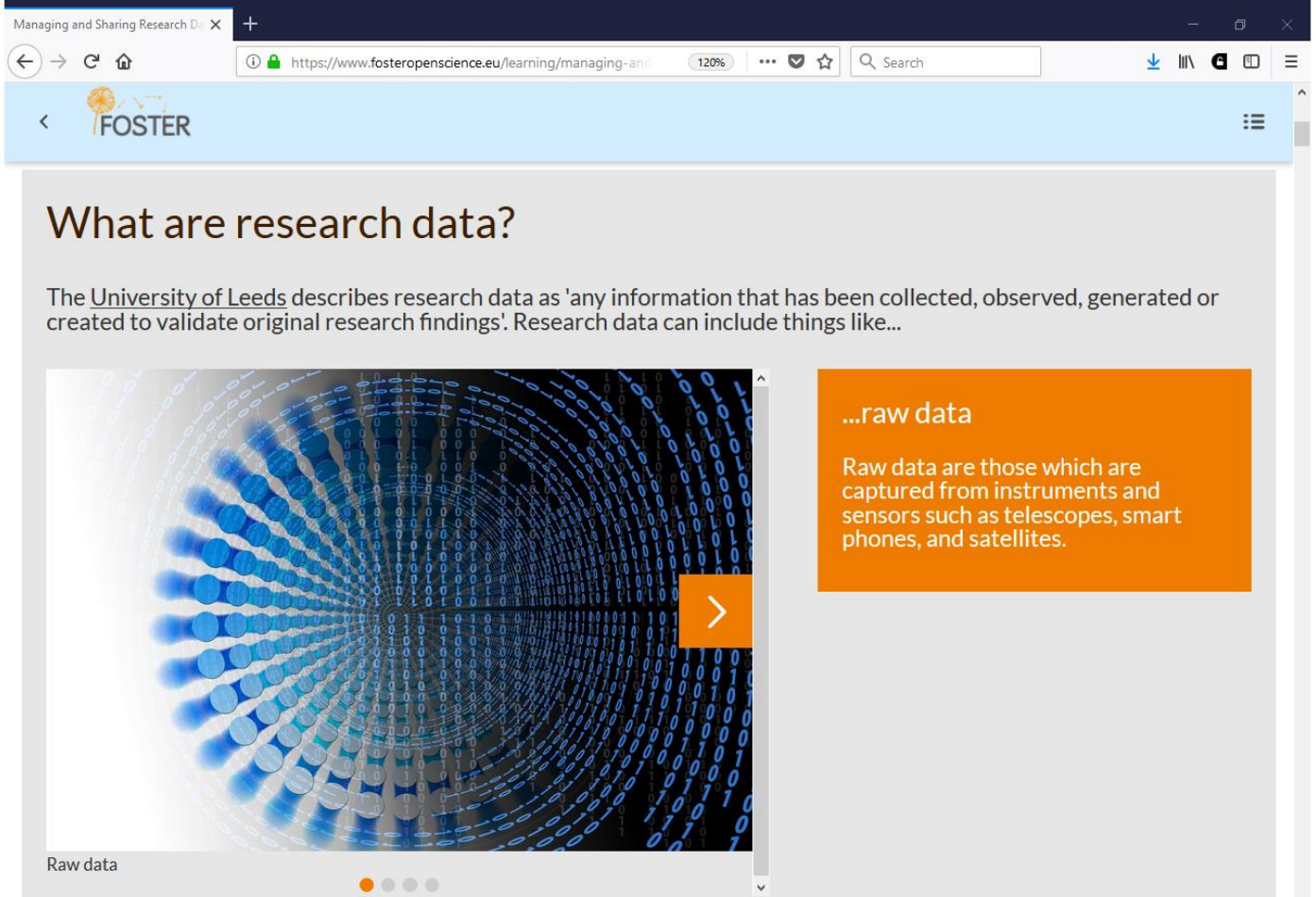
Defining your data

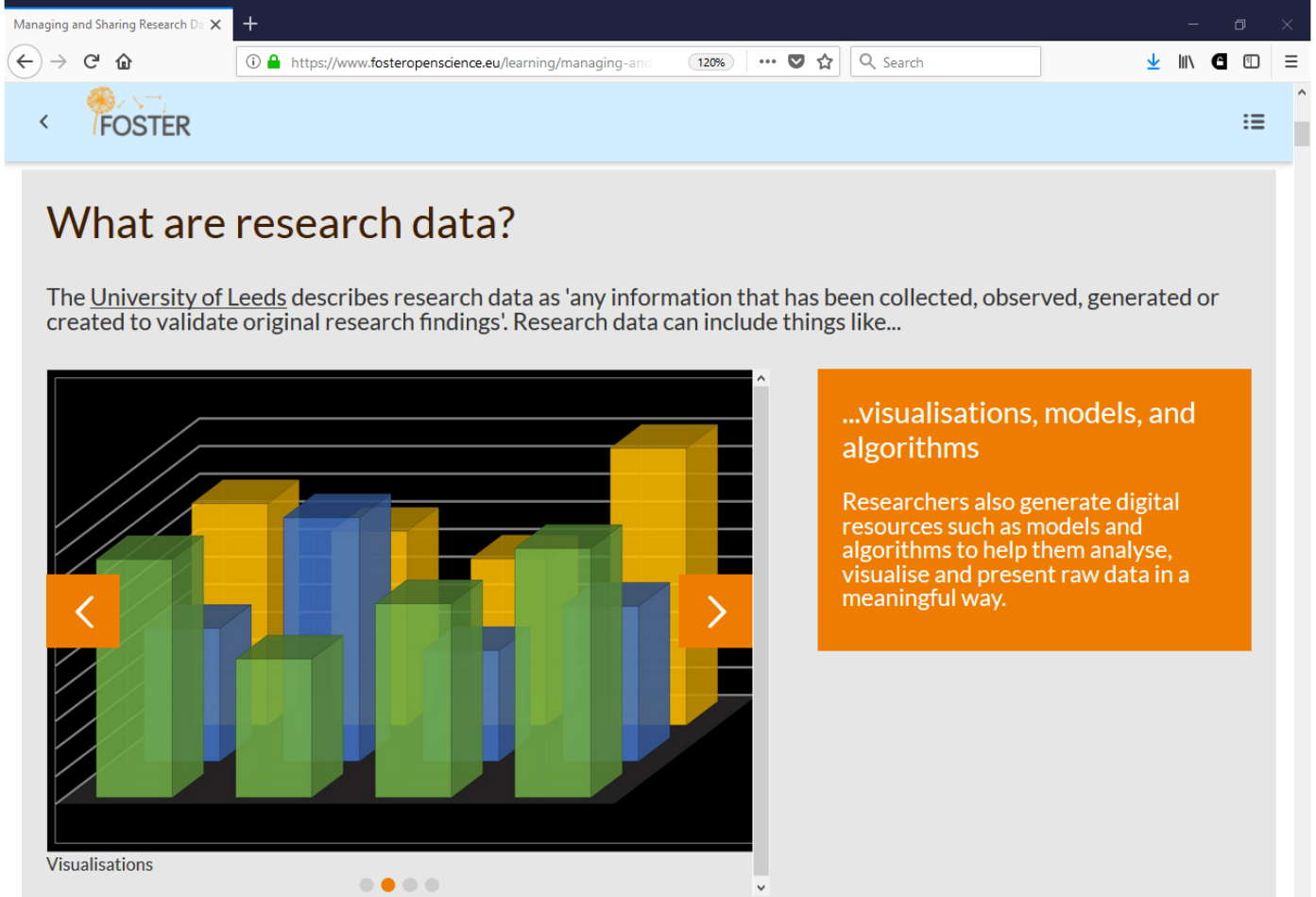
Describe your data (e.g. type, format, volume)



DATA FOR FUTURE GENERATIONS



https://www.fosteropenscience.eu/learning/managing-and-sharing-research-data



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What are research data?

The University of Leeds describes research data as 'any information that has been collected, observed, generated or created to validate original research findings'. Research data can include things like...

Digital images, audio and video files

...images, audio, and video files

Remember that digital images are data too. This is also true of any audio files or videos captured during the course of research such as taped interviews.

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What are research data?

The University of Leeds describes research data as 'any information that has been collected, observed, generated or created to validate original research findings'. Research data can include things like...

Data can be anything and everything!

...just about anything!

Essentially, research data can be just about anything that researchers produce or work with during the course of their research.

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Definition of Open Data

Open Data are online, free of cost, accessible data that can be used, reused and distributed provided that the data source is attributed.

Tip – when training use 5 Star Open Data Model to help explain FAIR

★ make your stuff available on the Web (whatever format) under an open license

★★ make it available as structured data (e.g., Excel instead of image scan of a table)

★★★ make it available in a non-proprietary open format (e.g., CSV instead of Excel)

★★★★ use URIs to denote things, so that people can point at your stuff

★★★★★ link your data to other data to provide context

Tim Berners-Lee's proposal for five star open data - http://5stardata.info

WHY SHOULD YOU BE OPEN?

Image by wonderwebby CC-BY-NC-SA www.flickr.com/photos/wonderwebby/2723279491

PUBLICATIONS AND DATA

It’s part of good research practice

"It was *never* acceptable to publish papers without making data available."

- Ewan Birney

#OpenData
#OpenScience

Original image via doi:10.1038/461145a. “Research cannot flourish if data are not preserved and made accessible. Data management should be woven into every course in science.” - *Nature* 461, 145

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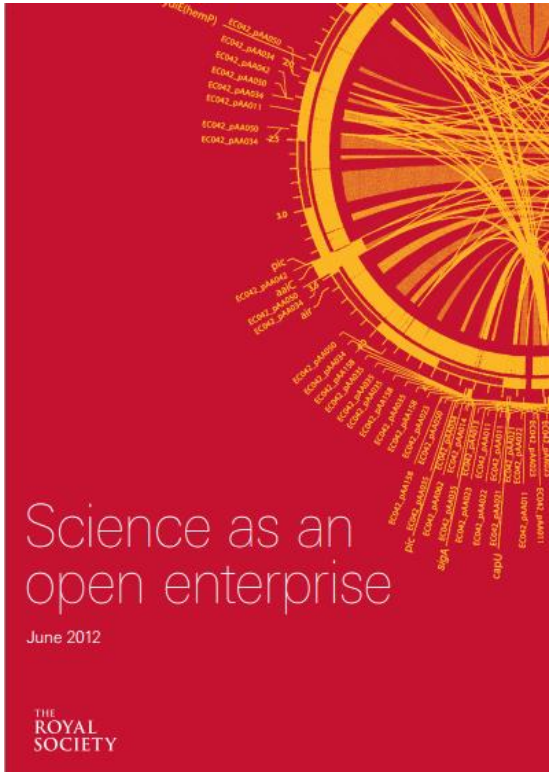
Science as an open enterprise

"Much of the remarkable growth of scientific understanding in recent centuries is due to open practices; open communication and deliberation sit at the heart of scientific practice."

Royal Society report calls for 'intelligent openness' whereby data are accessible, intelligible, assessable and usable.



https://royalsociety.org/policy/projects/science-public-enterprise/Report

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Cut down on academic fraud

nature International weekly journal of science

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Published online 1 November 2011 | *Nature* **479**, 15 (2011) | doi:10.1038/479015a
Updated online: 1 November 2011
Updated online: 8 December 2011

News

Report finds massive fraud at Dutch universities

Investigation claims dozens of social-psychology papers contain faked data.

Ewen Callaway

When colleagues called the work of Dutch psychologist Diederik Stapel too good to be true, they meant it as a compliment. But a preliminary investigative report (go.nature.com/tqmp5c) released on 31 October gives literal meaning to the phrase, detailing years of data manipulation and blatant fabrication by the prominent Tilburg University researcher.

Dutch psychologist Diederik Stapel.
Persbureau van Eijndhoven

"We have some 30 papers in peer-reviewed journals where we are actually sure that they are fake, and there are more to come," says Pim Levelt, chair of the committee that investigated Stapel's work at the university.

Stapel's eye-catching studies on aspects of social behaviour such as power and stereotyping garnered wide press coverage. For example, in a recent *Science* paper (which the investigation has not identified as fraudulent), Stapel reported that untidy environments encouraged discrimination (*Science* **332**, 251–253; 2011).

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www.nature.com/news/2011/111101/full/479015a.html

Validation of results

"It was a mistake in a spreadsheet that could have been easily overlooked: a few rows left out of an equation to average the values in a column.

The spreadsheet was used to draw the conclusion of an influential 2010 economics paper: that public debt of more than 90% of GDP slows down growth. This conclusion was later cited by the International Monetary Fund and the UK Treasury to justify programmes of austerity that have arguably led to riots, poverty and lost jobs."

The error that could subvert George Osborne's austerity programme

The theories on which the chancellor based his cuts policies have been shown to be based on an embarrassing mistake

Charles Arthur and **Phillip Inman**
The Guardian, Thursday 18 April 2013 21.10 BST

George Osborne says that Ken Rogoff, the man whose economic error has been uncovered, has strongly influenced his thinking. Photograph: Stefan Wermuth/PA

www.guardian.co.uk/politics/2013/apr/18/uncovered-error-george-osborne-austerity

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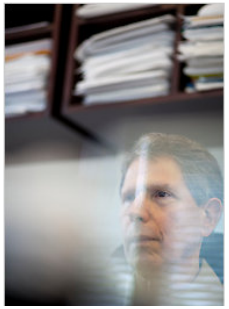
More scientific breakthroughs

Sharing of Data Leads to Progress on Alzheimer's

By GINA KOLATA
Published: August 12, 2010

In 2003, a group of scientists and executives from the National Institutes of Health, the Food and Drug Administration, the drug and medical-imaging industries, universities and nonprofit groups joined in a project that experts say had no precedent: a collaborative effort to find the biological markers that show the progression of Alzheimer's disease in the human brain.

Enlarge This Image



Now, the effort is bearing fruit with a wealth of recent scientific papers on the early diagnosis of Alzheimer's using methods like PET scans and tests of spinal fluid. More than 100 studies are under way to test drugs that might slow or stop the disease.

And the collaboration is already serving as a model for similar efforts against Parkinson's disease. A $40 million project to look for biomarkers for Parkinson's, sponsored by the Michael J. Fox Foundation, plans to enroll 600 study subjects in the United States and Europe.

"It was unbelievable. Its not science the way most of us have practiced in our careers. But we all realised that we would never get biomarkers unless all of us parked our egos and intellectual property noses outside the door and agreed that all of our data would be public immediately."

Dr John Trojanowski, University of Pennsylvania

www.nytimes.com/2010/08/13/health/research/13alzheimer.html?pagewanted=all&_r=0

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A citation advantage

A study that analysed the citation counts of 10,555 papers on gene expression studies that created microarray data, showed:

"studies that made data available in a public repository received 9% more citations than similar studies for which the data was not made available"

Data reuse and the open data citation advantage, Piwowar, H. & Vision, T. https://peerj.com/articles/175

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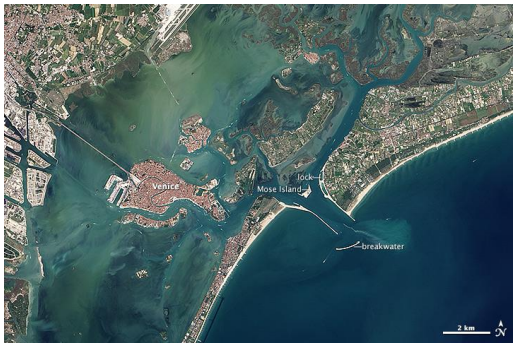
Increased use and economic benefit

The case of NASA Landsat satellite imagery of the Earth's surface:

Up to 2008

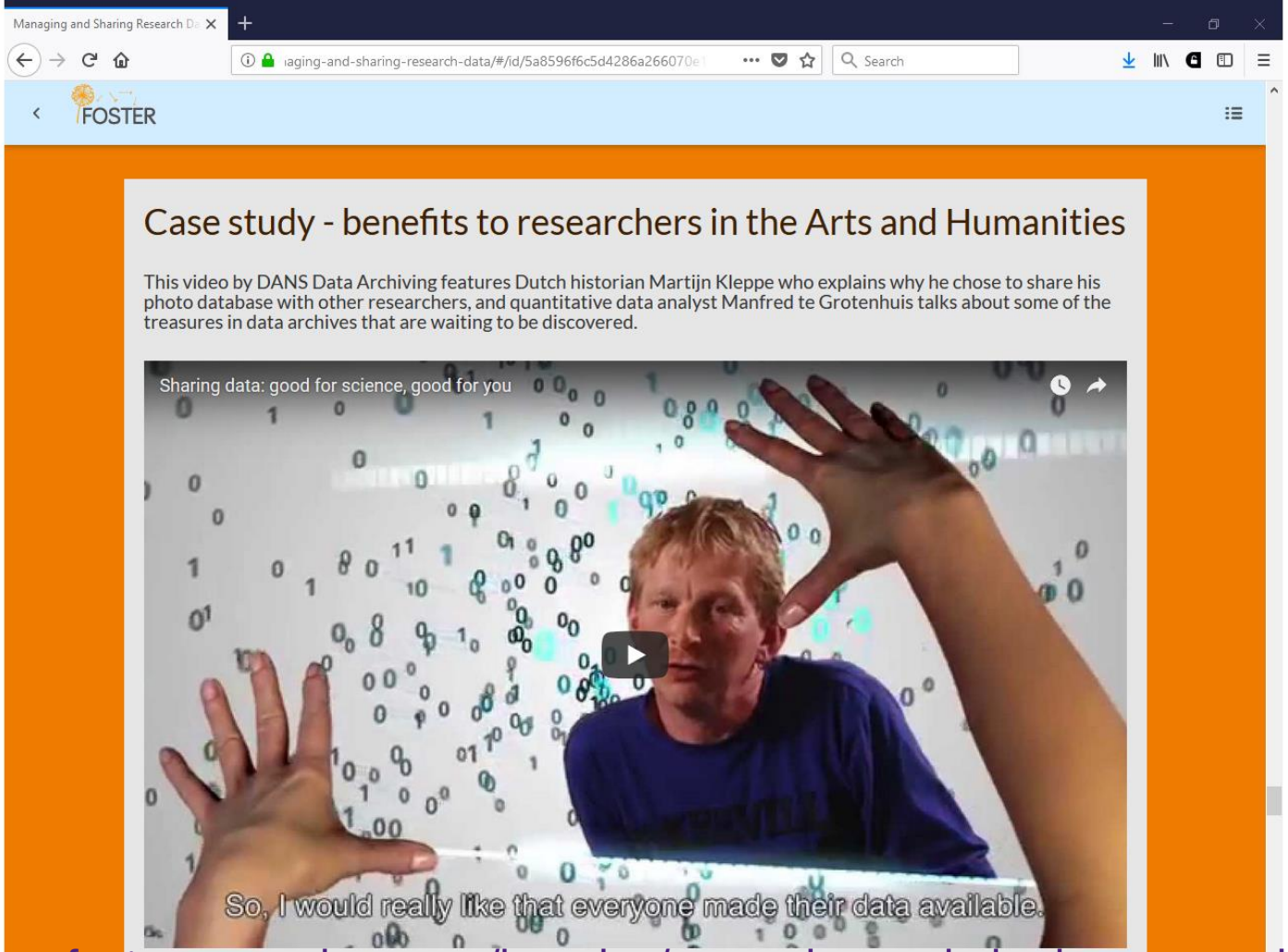
- Sold through the US Geological Survey for US$600 per scene
- Sales of 19,000 scenes per year
- Annual revenue of $11.4 million



Since 2009

- Freely available over the internet
- Google Earth now uses the images
- Transmission of 2,100,000 scenes per year.
- Estimated to have created value for the environmental management industry of $935 million, with direct benefit of more than $100 million per year to the US economy
- Has stimulated the development of applications from a large number of companies worldwide

http://earthobservatory.nasa.gov/IOTD/view.php?id=83394&src=ve



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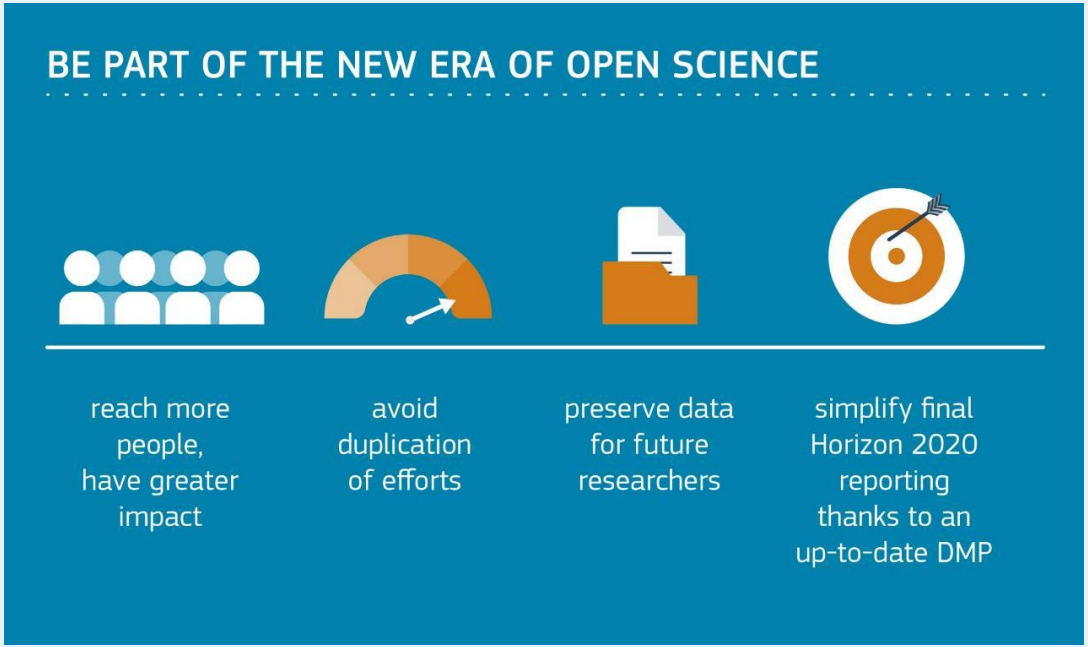

BE PART OF THE NEW ERA OF OPEN SCIENCE
reach more people, have greater impact
avoid duplication of efforts
preserve data for future researchers
simplify final Horizon 2020 reporting thanks to an up-to-date DMP

Looking after your data

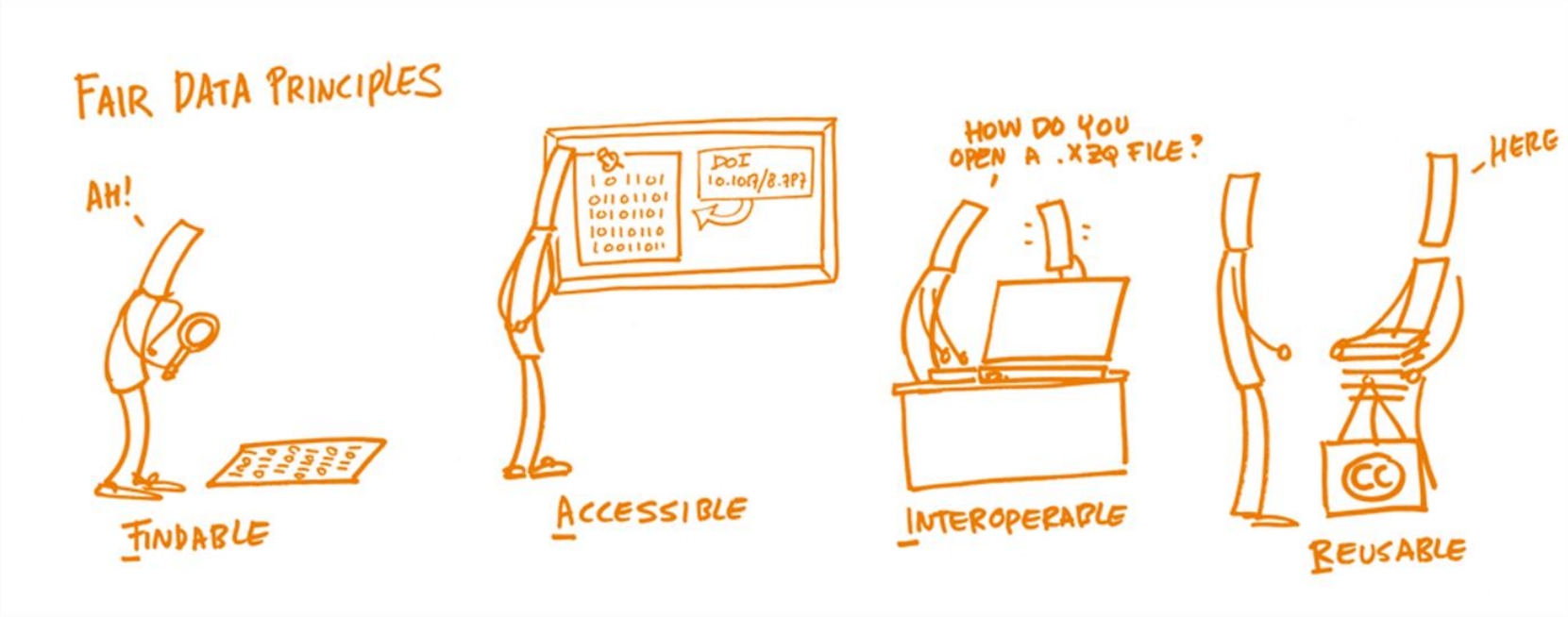
Explain how you will manage your data, noting particular concerns or issues (e.g. storage and backup, data structuring, versioning, documentation)

Sharing your data

Explain which data will be shared and how (e.g. via repository, under what licence)

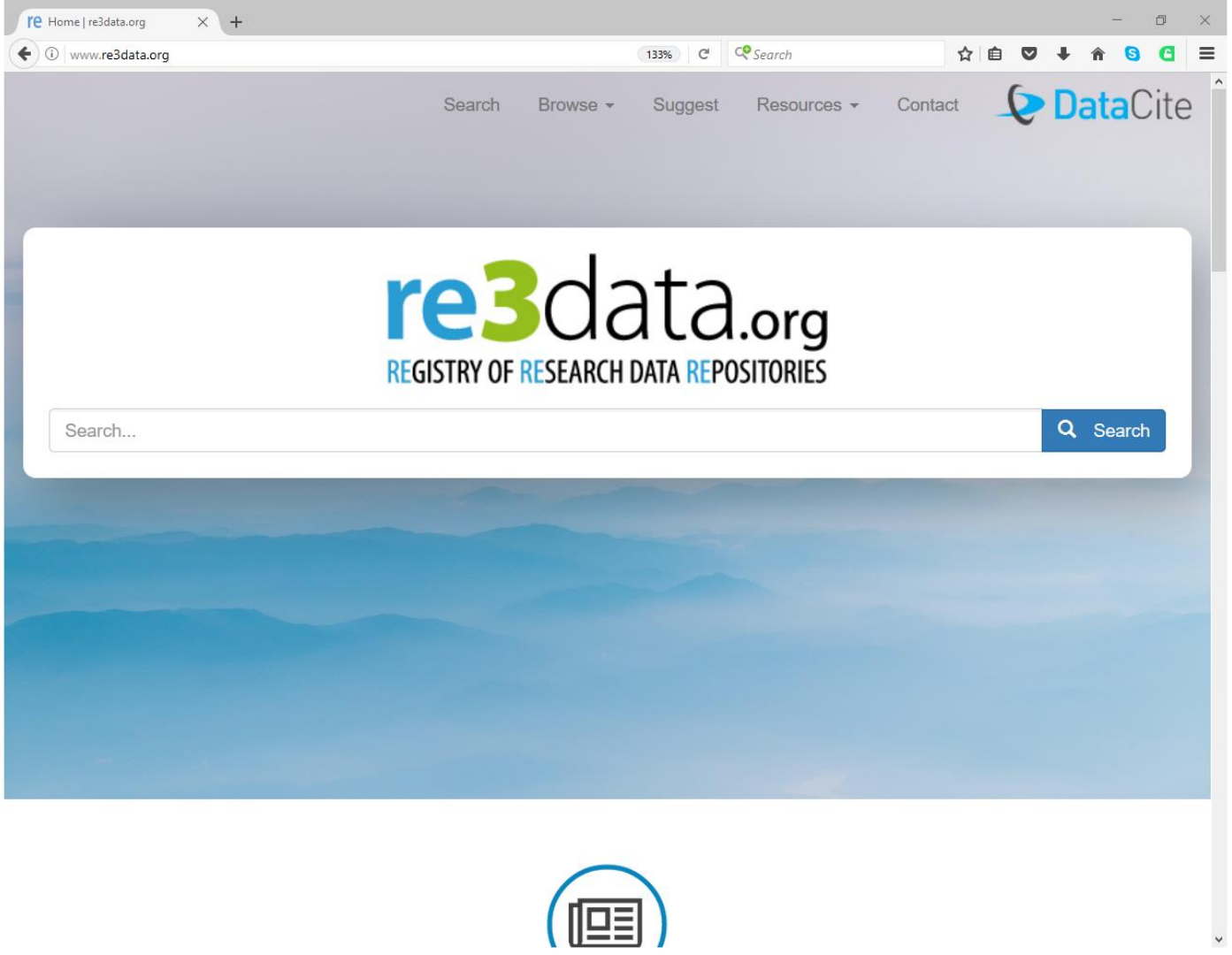
Misconception #1:

My web page is a FAIR way to share my data.



Better options for open data

- Domain repository (first choice)
- General repository (Figshare, Zenodo, Dryad)
- Institutional repository
- Data journal
- Journal supplementary material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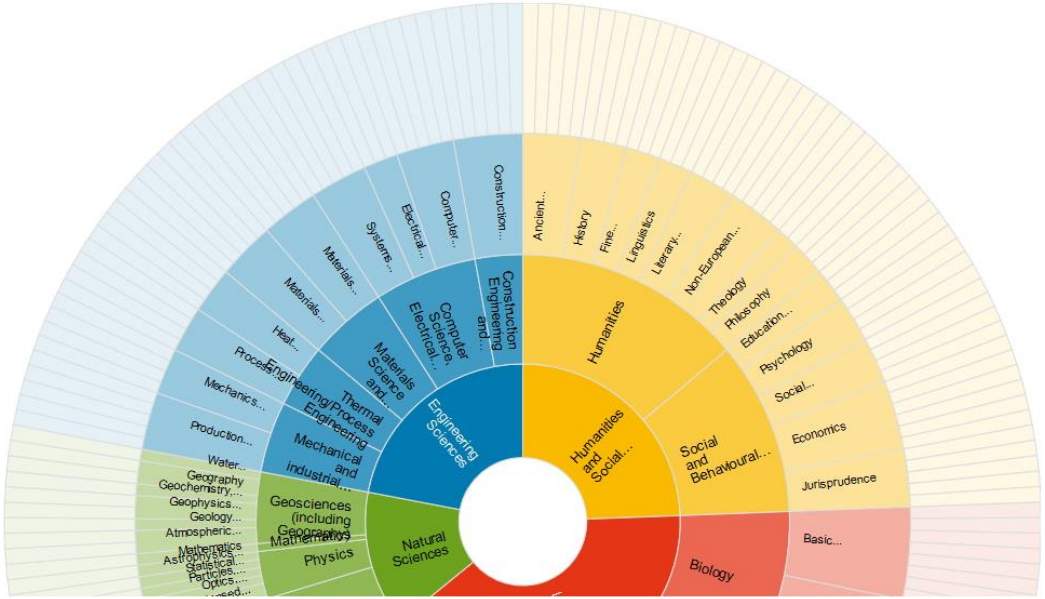
Graphical Text

click to zoom into subjects or to select a bottommost subject in the hierachy as filter for the re3data search page
ctrl + click on a top subject to select it as filter



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  - I. Ancient Cultures
    1. Prehistory
    2. Classical Philology
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    4. Classical Archaeology
    5. Egyptology and Ancient Near Eastern Studies
  - II. History
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    2. Early Modern History
    3. Modern and Current History
    4. History of Science
  - III. Fine Arts, Music, Theatre and Media Studies
    1. Art History
    2. Musicology
    3. Theatre and Media Studies
  - IV. Linguistics
    1. General and Applied Linguistics
    2. Individual Linguistics
    3. Typology, Non-European Languages, Historical Linguistics
  - V. Literary Studies
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    2. Modern German Literature
    3. European and American Literature
    4. General and Comparative Literature and Cultural Studies

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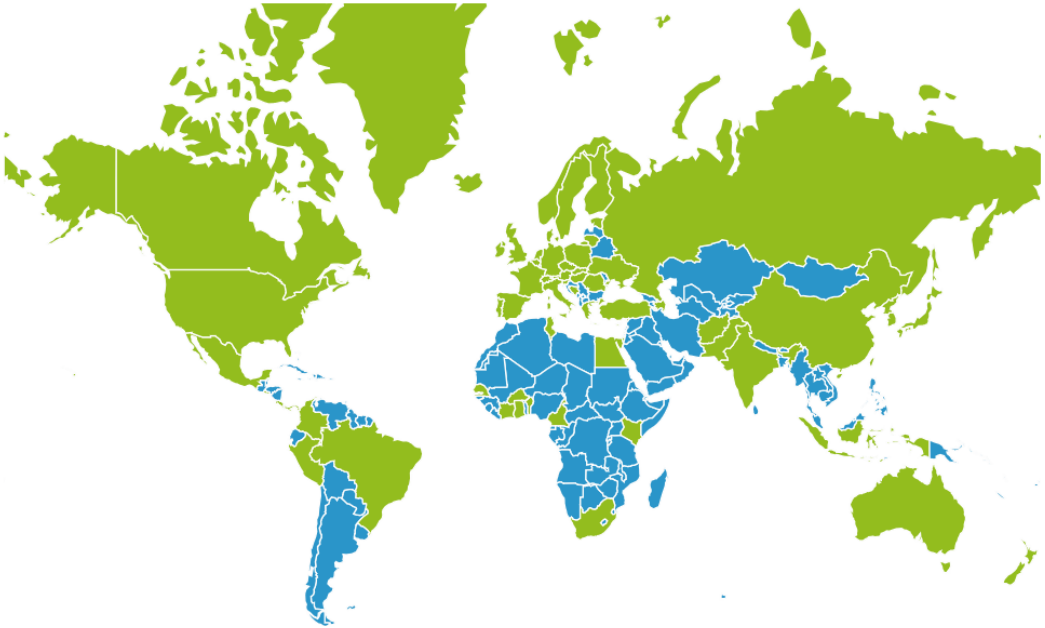

Browse by country

Graphical | Text

- International
- Afghanistan
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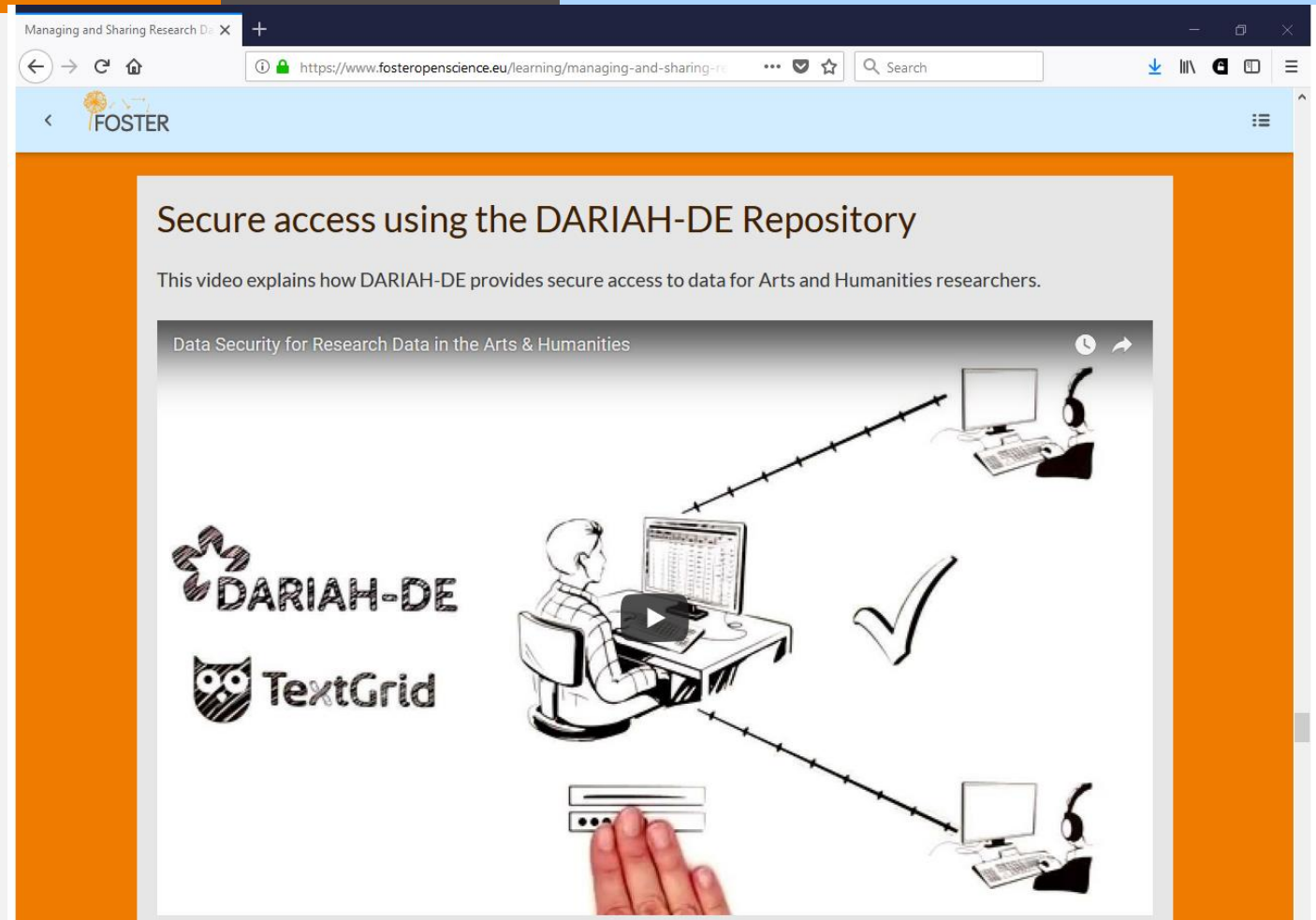
- Austria
- Azerbaijan
- Belgium
- Benin
- Burkina Faso
- Bosnia and Herzegovina
- Brazil
- Canada
- Switzerland
- China
- Cote d'Ivoire
- Cameroon
- Colombia
- Costa Rica
- Cyprus
- Czech Republic
- Germany
- Denmark
- European Union
- Egypt
- Spain
- Estonia

There are ways to share sensitive data too

- Open metadata
- Data brokers and data access committees
- Safe havens
- Institutional data archive/vault



https://www.fosteropenscience.eu/learning/managing-and-sharing-research-data

Tip – some repository decisions are tricky

- There my be a preferred repository that the funder expects
- Data from multidisciplinary studies may not have an obvious home
- Data types and volumes will also need to be taken into account

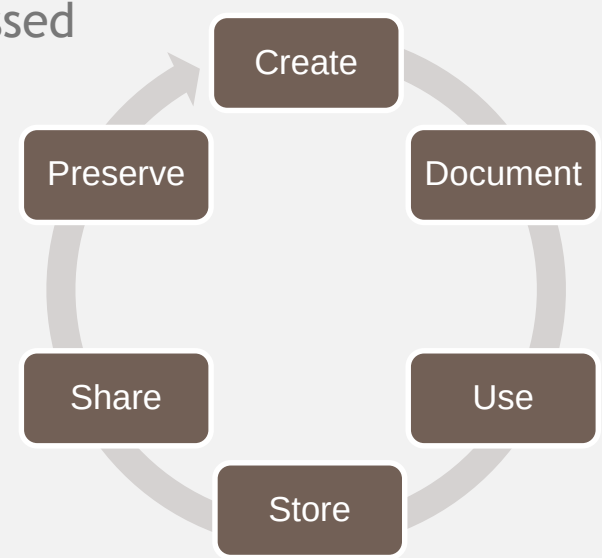
Misconception #2:

I don’t need to decide now if I want to share. I can wait and see what I want to do at the end of my project.

Open Data doesn’t just happen - data management planning helps!

- What data will be created (format, types, volume...)
- Standards and methodologies to be used (incl. metadata)
- How ethics and Intellectual Property will be addressed
- Plans for data sharing and access
- Strategy for long-term preservation

A DMP is a plan to share!



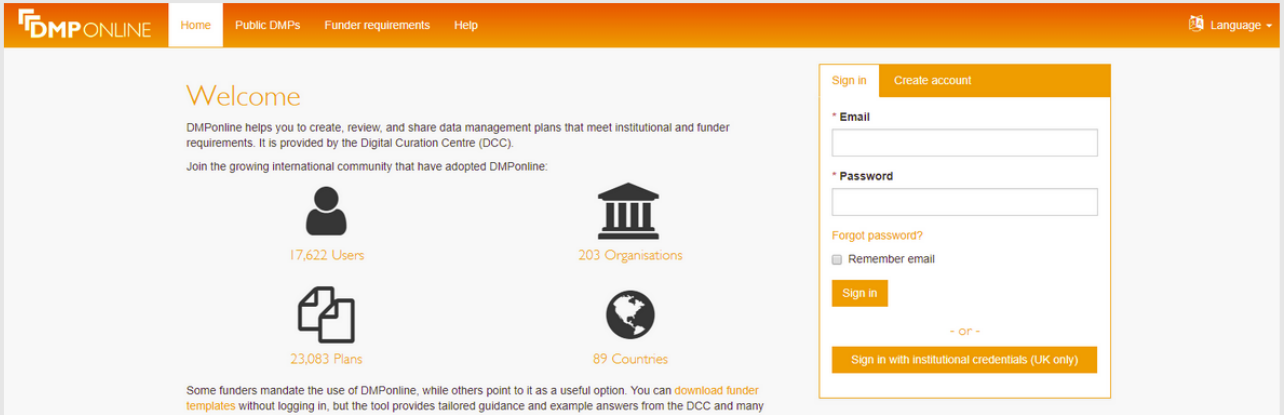
Tip – use existing tools and guidance to help write their plans

https://dmponline.dcc.ac.uk

Data management planning tools - DMPonline

DMPonline is a freely available tool that helps research teams to write data management plans that meet funding body requirements. DMPonline was jointly developed by the Digital Curation Centre (DCC) and the University of California Curation Center (UC3). The tool contains a number of templates that represent the requirements of different funding bodies across Europe. Users are asked three questions at the outset to determine the appropriate template to display (e.g. the Economic and Social Research Council (ESRC) template when applying for an ESRC grant). Using tools like DMPonline takes the guesswork out of writing your data management plan by providing you with the specific set of questions that individual funding bodies want you to answer. The tool also provides users with general guidance - and where provided, institutional guidance - to make sure that your answers are realistic and implementable.

For more information on data management plans and tips on writing them, check out the DCC website.



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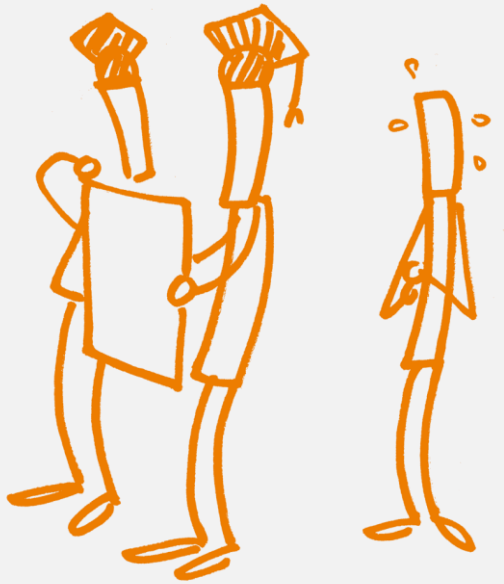
Misconception #3:

If I share my data early, I'll be scooped!



Pre-registration timestamps your work

Register Your Project

A registration on OSF creates a frozen, time-stamped version of a project that cannot be edited or deleted. The *original project* can still be edited, while the registered version cannot. You might create a registration to capture a snapshot of your project at certain points in time - such as right before data collection begins, when you submit a manuscript for peer review, or upon completion of a project.

Registrations can be made public immediately or embargoed for up to 4 years. Registrations cannot be deleted, but they can be withdrawn. Withdrawing a registration removes the content of the registration but leaves behind basic metadata, like registration title, contributors, and a reason for the withdrawal (not required).

http://help.osf.io/m/registrations/l/524205-register-your-project

Tips – share preprints too

- Early feedback on methods and initial findings
- Time to correct and mistakes before publishing
- Recognition for your ideas by peers

Misconception #4:

I have to keep and share everything.

Image: ‘Balancing rocks’ by Viewminder CC-BY-SA-ND www.flickr.com/photos/light_seeker/7780857224

Deciding which data need to be kept after the project ends

Five steps to follow

1. **Could** this data be re-used
2. **Must** it be kept as evidence or for legal reasons
3. **Should** it be kept for its potential value
4. **Consider costs** – do benefits outweigh cost?
5. **Evaluate criteria** to decide what to keep

5 steps to decide what data to keep

www.dcc.ac.uk/resources/how-guides/five-steps-decide-what-data-keep

Tip – link data to other outputs for context (reuse)

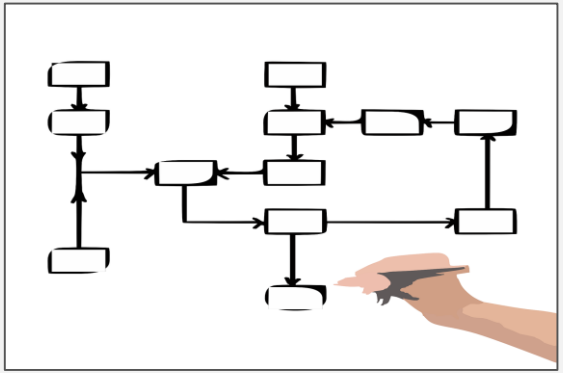
Open Data

To support validation and facilitate reuse

Open Code

Software created to analyse and/or visualise the data

Open Workflows



What steps were taken and in what order?

Consider who else has a say about sharing data

- Collaborators
- Research participants
- Commercial partners
- Data repository

Exercise: barriers to data sharing

In groups of 2-3, consider any barriers to sharing data.

If there are any specific issues for your discipline please feel free to note these.

10 minutes plus feedback

How to make data open?

https://okfn.org

1. Choose your dataset(s)
   - What can you open? You may need to revisit this step if you encounter problems later.
2. Apply an open license
   - Determine what IP exists. Apply a suitable licence e.g. CC-BY
3. Make the data available
   - Provide the data in a suitable format. Use repositories.
4. Make it discoverable
   - Post on the web, register in catalogues…

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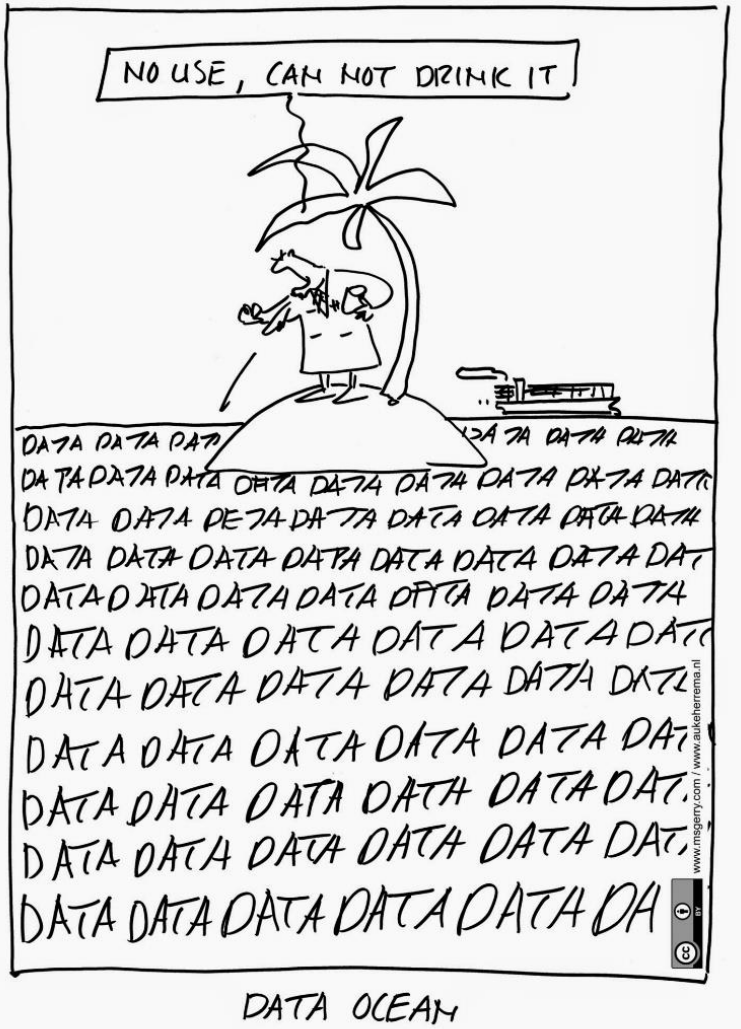


Image courtesy of http://aukeherrema.nl CC-BY

WHAT IS A DMP & WHY WRITE ONE?

Data Management Plans (DMP)

A DMP is a brief plan to define:

- how the data will be created
- how it will be documented
- who will be able to access it
- where it will be stored
- who will back it up
- whether (and how) it will be shared & preserved

DMPs are often submitted as part of grant applications, but are useful whenever researchers are creating data.

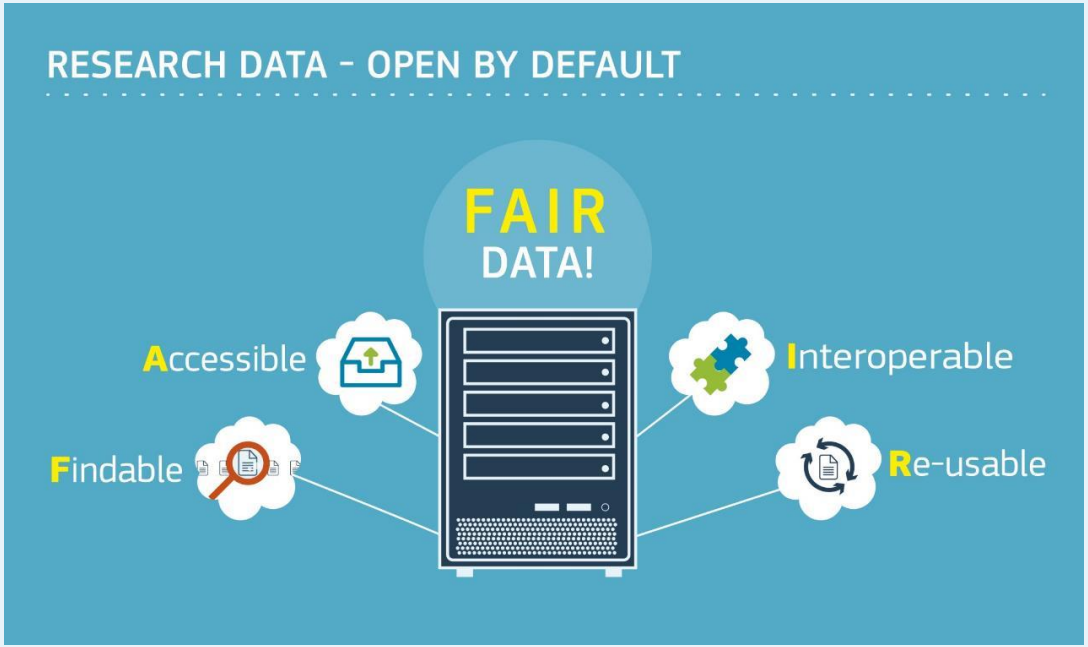
European Commission

OPEN RESEARCH DATA IN HORIZON 2020

Jean-François Dechamp & Daniel Spichtinger

European Commission
Directorate-General for Research & Innovation

Research and Innovation


RESEARCH DATA - OPEN BY DEFAULT
FAIR
DATA!
Accessible
Findable
Interoperable
Re-usable

Making data FAIR

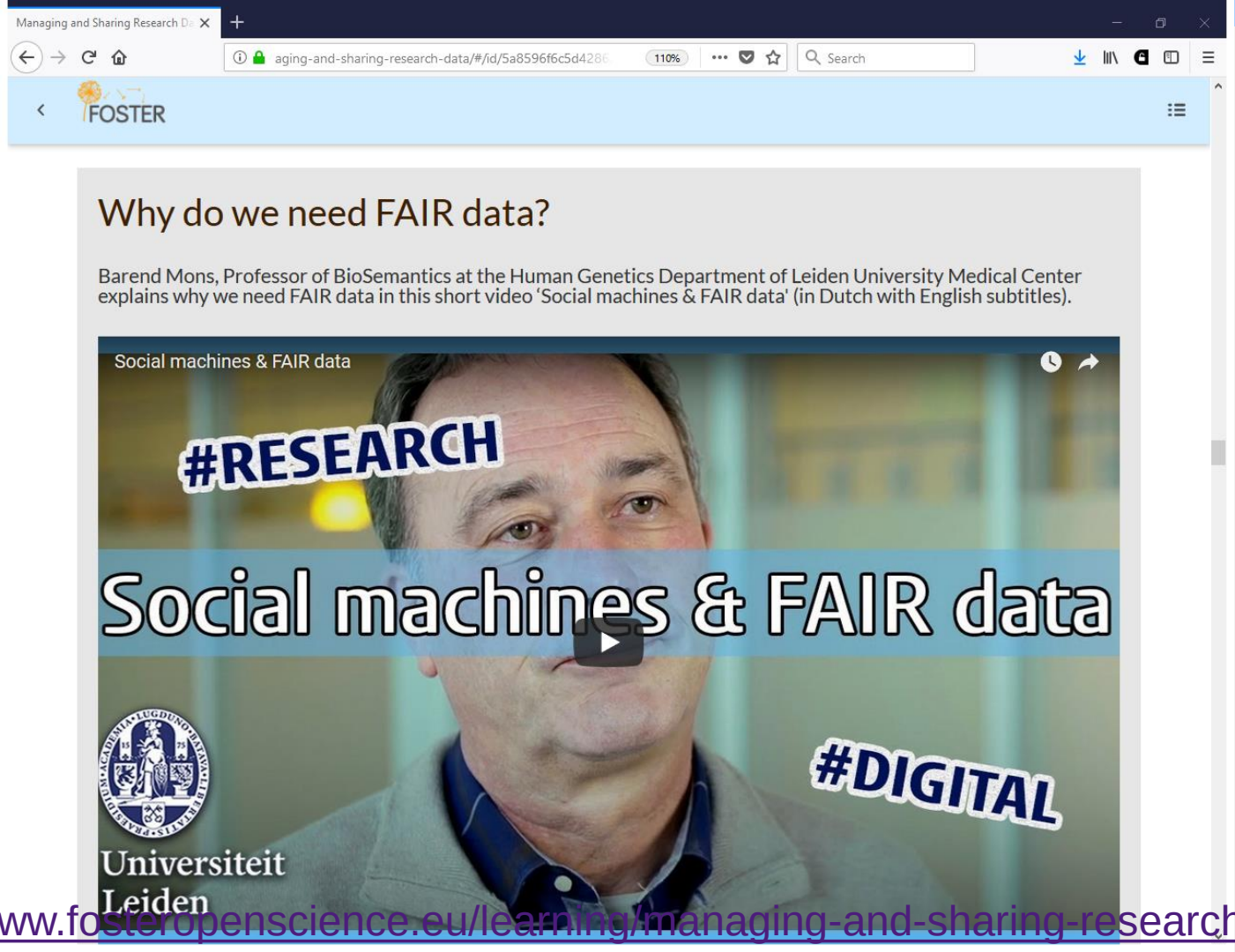
Findable – Assign persistent IDs, provide rich metadata, register in a searchable resource,...

Accessible - Retrievable by their ID using a standard protocol, metadata remain accessible even if data aren't...

Interoperable - Use formal, broadly applicable languages, use standard vocabularies, qualified references...

Reusable - Rich, accurate metadata, clear licences, provenance, use of community standards

www.force11.org/group/fairgroup/fairprinciples



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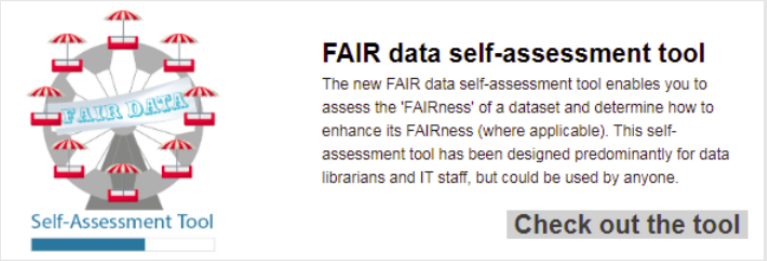
Assessing the FAIRness of your data

FAIR self-assessment tool

This self-assessment tool was developed by the Australian ANDS-Nectar-RDS initiative and enables you to assess the 'FAIRness' of a dataset and determine how to enhance its FAIRness. it was developed primarily for research support staff but can be used by anyone.

ANDS, Nectar and RDS are supported by the Australian Government through the National Collaborative Research Infrastructure Strategy program.



ANDS-Nectar-RDS FAIR self-assessment tool

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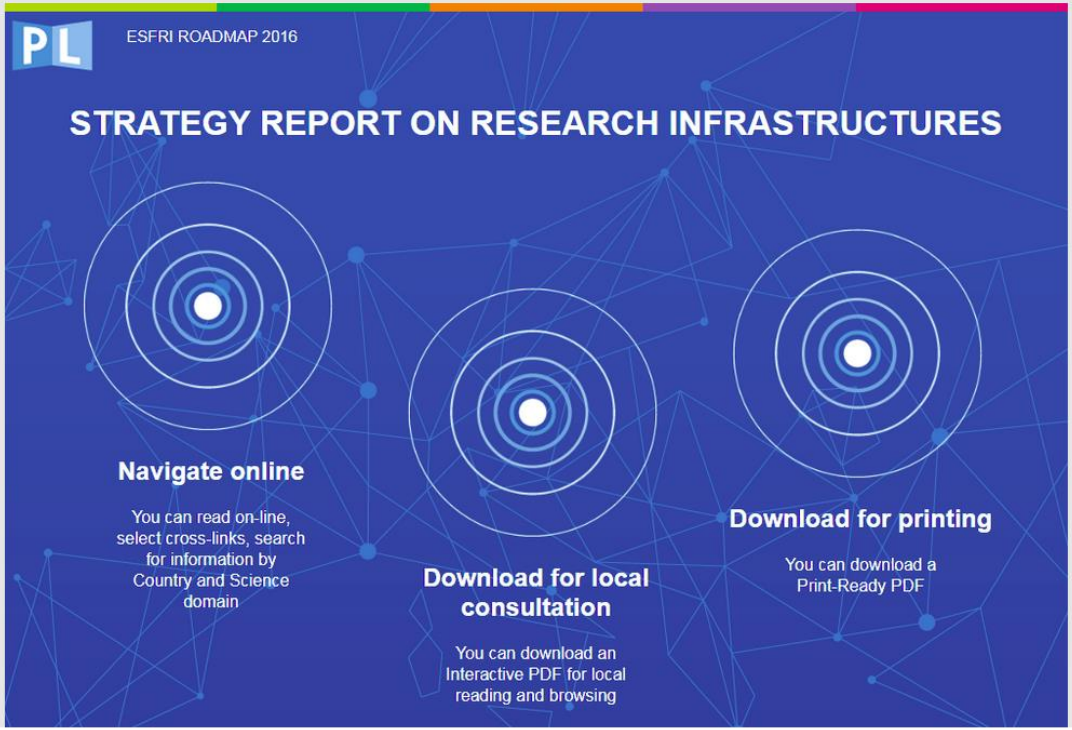
https://www.fosteropenscience.eu/learning/managing-and-sharing-research-data

European Research Infrastructure to support FAIR data

There are a number of existing and emerging research infrastructures being developed through support from the European Commission and other European funding bodies and governments. Consider making use of these to help you to manage and share your data. To find out more about the range of research infrastructures available for your discipline, check out the European Strategy Forum on Research Infrastructures (ESFRI) Roadmap.



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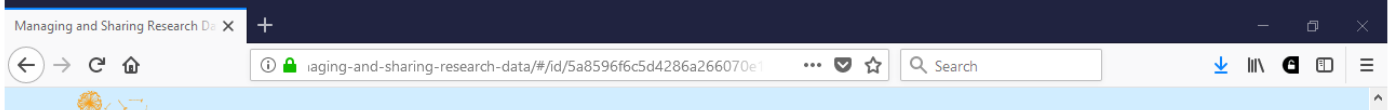
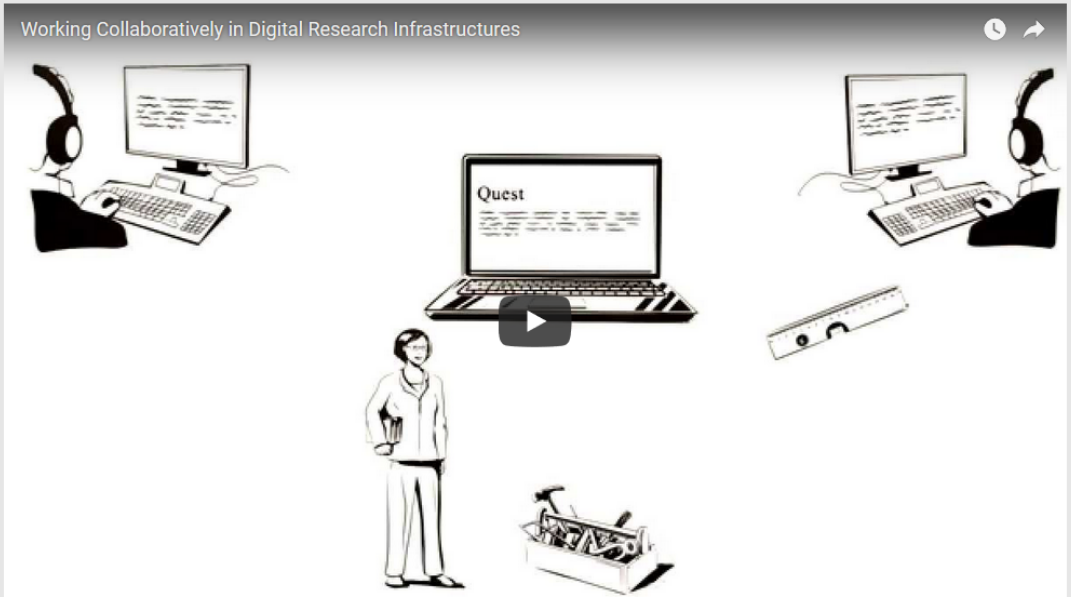


Case study - making Arts and Humanities research data FAIR using the DARIAH-DE infrastructure

This brief overview of DARIAH-DE research infrastructure shows you how their tools and resources can help you to share and store Arts and Humanities data and work collaboratively.



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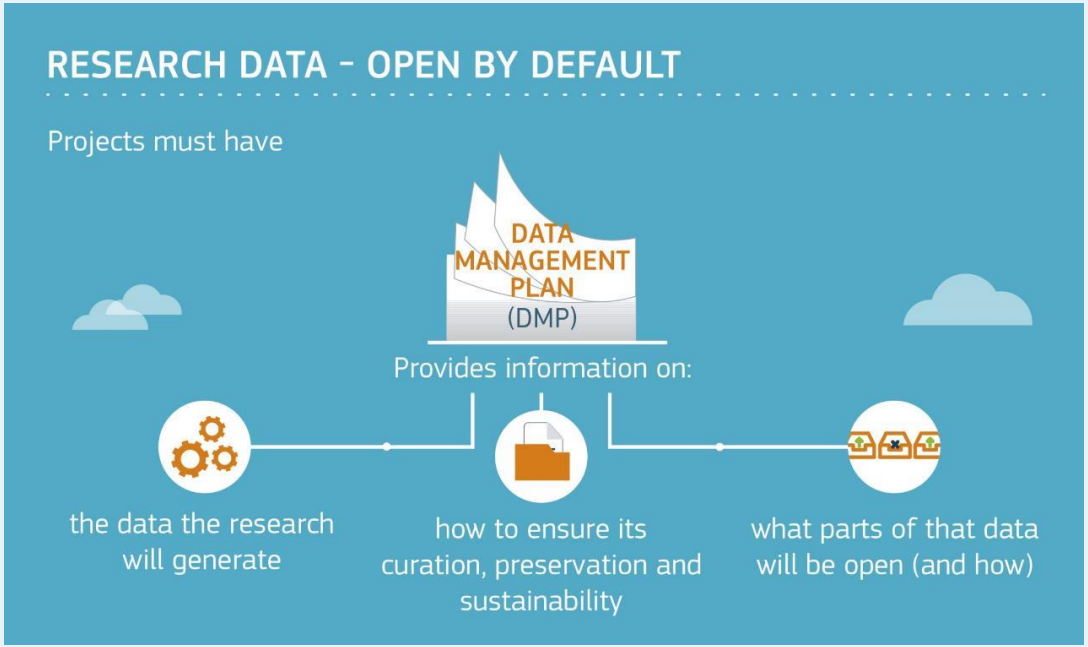
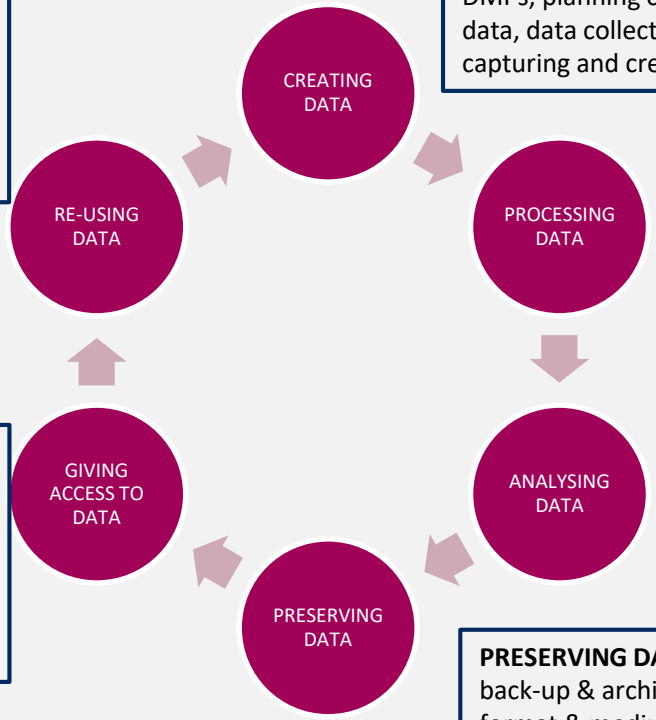

RESEARCH DATA - OPEN BY DEFAULT
Projects must have
DATA MANAGEMENT PLAN (DMP)
Provides information on:
the data the research will generate
how to ensure its curation, preservation and sustainability
what parts of that data will be open (and how)

Research data lifecycle

RE-USING DATA: follow-up research, new research, undertake research reviews, scrutinising findings, teaching & learning

CREATING DATA: designing research, DMPs, planning consent, locate existing data, data collection and management, capturing and creating metadata



PROCESSING DATA: entering, transcribing, checking, validating and cleaning data, anonymising data, describing data, manage and store data

ANALYSING DATA: interpreting, & deriving data, producing outputs, authoring publications, preparing for sharing

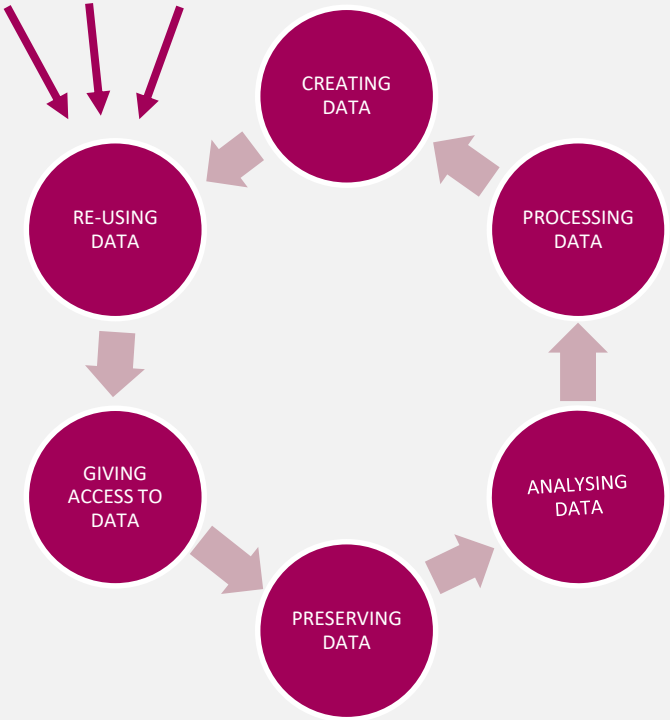
PRESERVING DATA: data storage, back-up & archiving, migrating to best format & medium, creating metadata and documentation

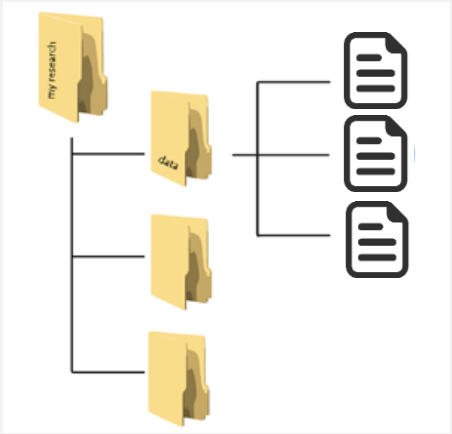
ACCESS TO DATA: distributing data, sharing data, controlling access, establishing copyright, promoting data

Ref: UK Data Archive: http://www.data-archive.ac.uk/create-manage/life-cycle

Planning trick 1: think backwards

What data organisation would a re-user like?





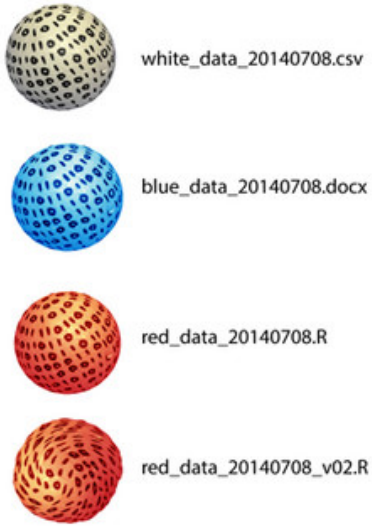
Data organisation

Meaningful file names

Below are tips on meaningful and consistent file names. Read more in '*Choosing a file name*'. (2)

- Make sure to use consistent file names. When you use a date in the file name, choose a notation (for instance, YYYYMMDD of yymmdd).
- Do not use strange characters like ?\!@*%{[<> in the file name.
- Use traceable file names, such as Project_Instrument_locatie_YYYYMMDD.ext.
- Make sure to only use each file once in the folder structure. If you store a file in more than one place, several versions of the same file can unwillingly be created.
- See also version management.

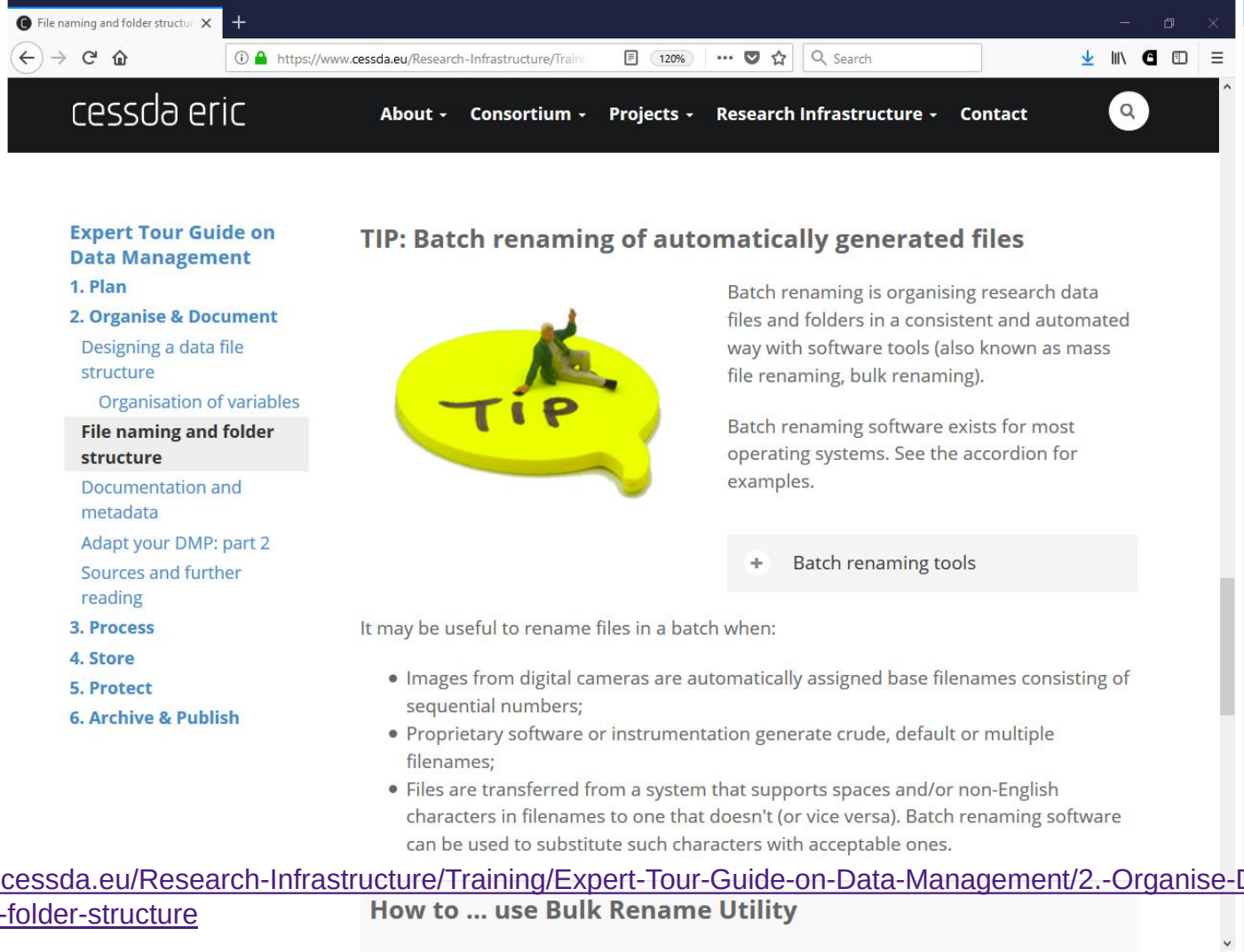
It is good practice to note the file naming and its meaning in a readme.txt.



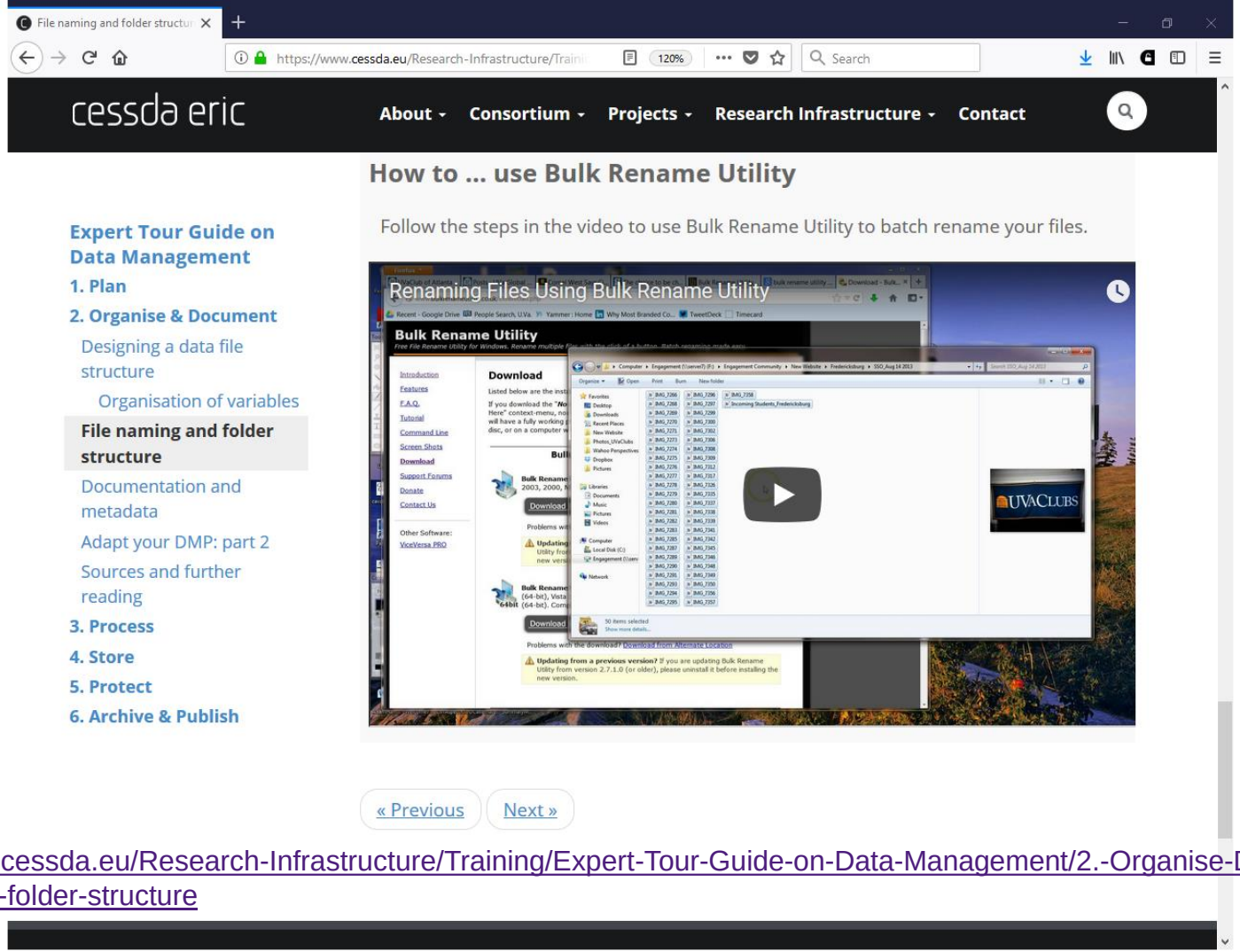
File naming and version management

Even if a researcher is well underway with his project consistent file naming is still an option by using a *bulk file rename utility*. (3) It is important, however, to check if this bulk renamer delivers on its promises.

http://datasupport.researchdata.nl/en/start-de-cursus/iii-onderzoeksfase/organising-data



https://www.cessda.eu/Research-Infrastructure/Training/Expert-Tour-Guide-on-Data-Management/2.-Organise-Document/File-naming-and-folder-structure



https://www.cessda.eu/Research-Infrastructure/Training/Expert-Tour-Guide-on-Data-Management/2.-Organise-Document/File-naming-and-folder-structure

Technical plan

Naming convention: [PI Surname] TechP

Before reading this section, please see the **Case for Support Guidance** regarding a Technical Summary.

A Technical Plan should be no more than four pages long and provided for all applications where digital outputs or digital technologies are an essential part to the planned research outcomes. A digital output or digital technology is defined as an activity which involves the creation, gathering, collecting and/or processing of digital information. For present purposes digital technologies do not include conventional software such as word processing packages and ICT activities such as email.

Please read this guidance carefully and consider its definitions within the context of your own research proposal.

The purpose of the Technical Plan is to demonstrate to the AHRC that technical provisions within a research proposal have been adequately addressed in terms of:

(a) Delivering the planned digital output or the digital technology from a practical and

Naming convention: [PI Surname] TechP

Before reading this section, please see the Case for Support Guidance regarding a Technical Summary.

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Please read this guidance carefully and consider its definitions within the context of your own research proposal.

The purpose of the Technical Plan is to

Why manage data?

NON PECUNIAE INVESTIGATIONIS CURATORE

SED VITAE FACIMUS PROGRAMMAS DATORUM

(Not for the research funder, but for life we make data management plans)

PROCURATIONIS

- Make your research easier
- Stop yourself drowning in irrelevant stuff
- Save data for later
- Avoid accusations of fraud or bad science
- Write a data paper
- Share your data for re-use
- Get credit for it

Managing and Sharing Research D...

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Why bother writing a DMP?

Some researchers are a bit sceptical about the value of writing a data management plan and feel it is just another administrative burden. There are lots of good reasons for writing a data management plan. Here are just a few of them.

Research Integrity

To support research integrity

Data management planning helps:

- avoid accusations of fraud or bad science as you can produce evidence for findings and enable validation
- support good research practice
- meet funding body requirements

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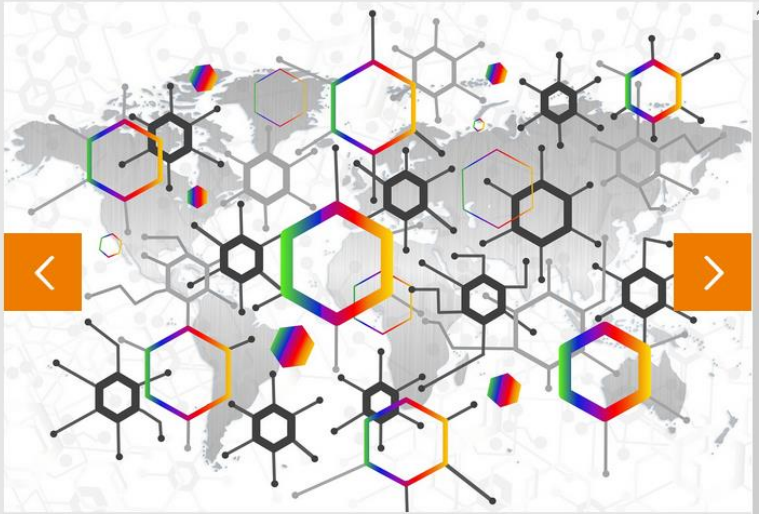

Sharing

Improves your potential to share

Data management planning supports responsible sharing which helps to:

- enable others to reuse and build on your research
- achieve greater impact and foster new collaborations
- promote innovation and allow research in your field to advance more quickly

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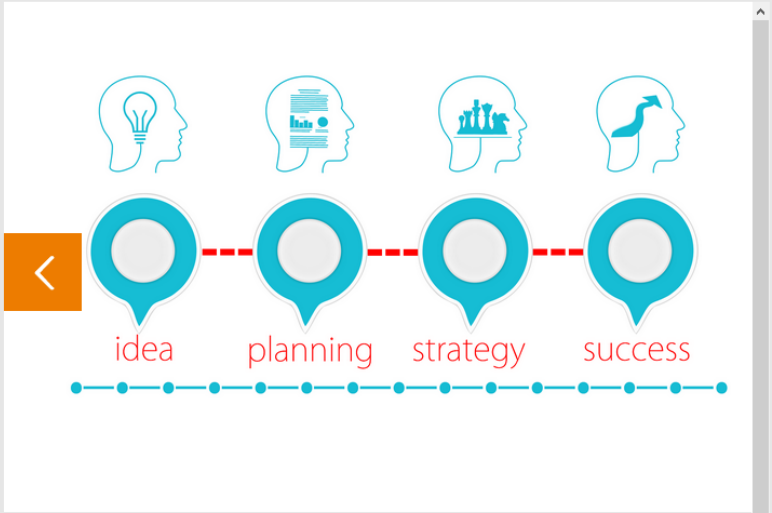


Success

Direct benefits for you!

Data management planning provides benefits for you too! Good data management planning:

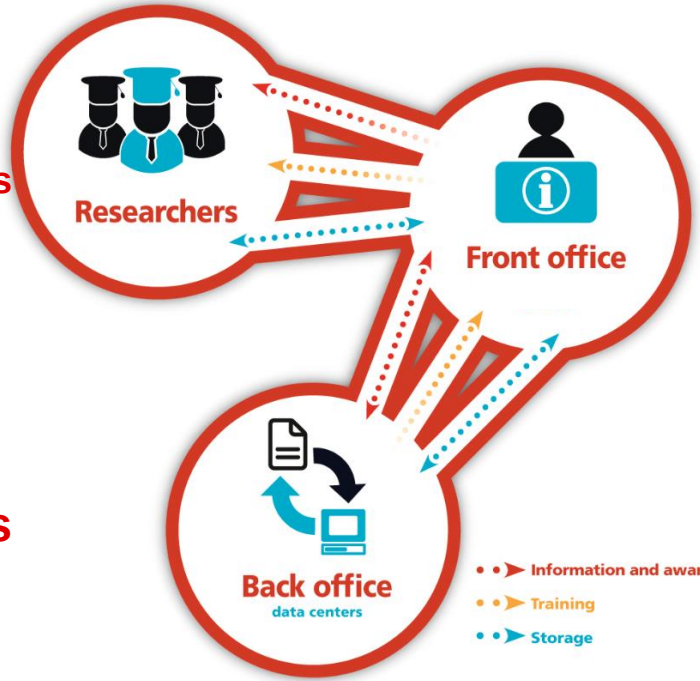
- avoids you drowning in irrelevant data
- helps you to know which versions of your data are most up-to-date
- helps you to understand and reuse your own data in the future
- gets you higher citation rates

https://www.fosteropenscience.eu/learning/managing-and-sharing-research-data

Planning trick 2: include RDM stakeholders

Commercial partners

Publishers
Data Availability policy



Institution
RDM policy
Facilities

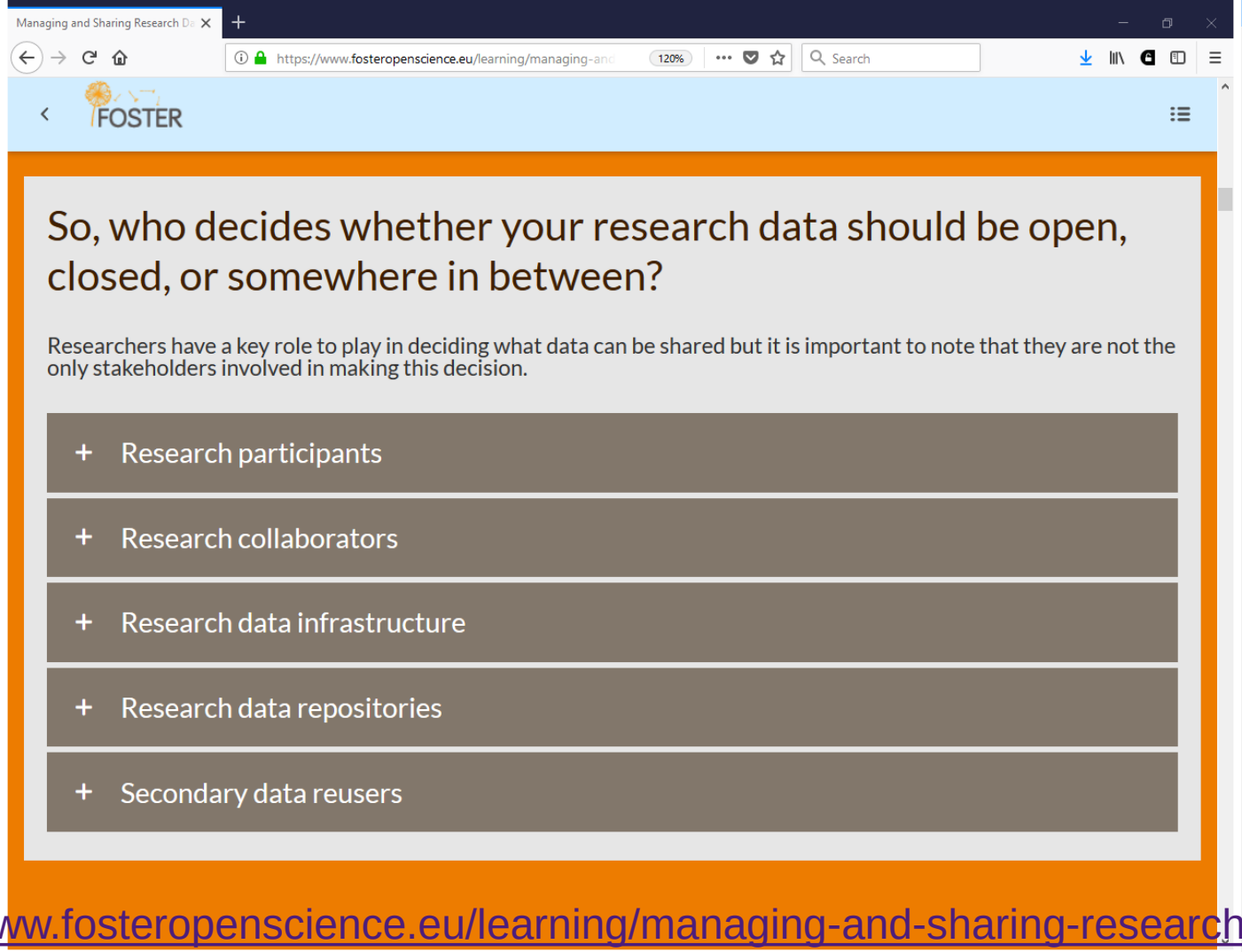
Research funders

https://www.openaire.eu/briefpaper-rdm-infonoads

Responsibilities in RDM

- The principal investigator – ultimately responsible for the data and for data management
- Researchers, research assistants and/or data managers – involved in day-to-day data management
- The institution's management – draft and enforce data policies; raise data awareness
- The institution's research office consisting of library, IT and legal services – provide external data, tools, secure storage and access; expertise on rights management and ethics, data citation, metadata, access and licenses, funder requirements; raise data awareness
- Research funders – encourage good data practices; invest in data infrastructure; raise data awareness
- Project partners in academic and other research institutions as well as commercial partners
- Academic publishers – impose requirements on the availability of data underlying submitted and/or published papers; provide identifiers to cite papers and link to related data
- Research data repositories – preserve data long term; provide persistent identifiers and data discovery service

https://www.openaire.eu/briefpaper-rdm-infonoads



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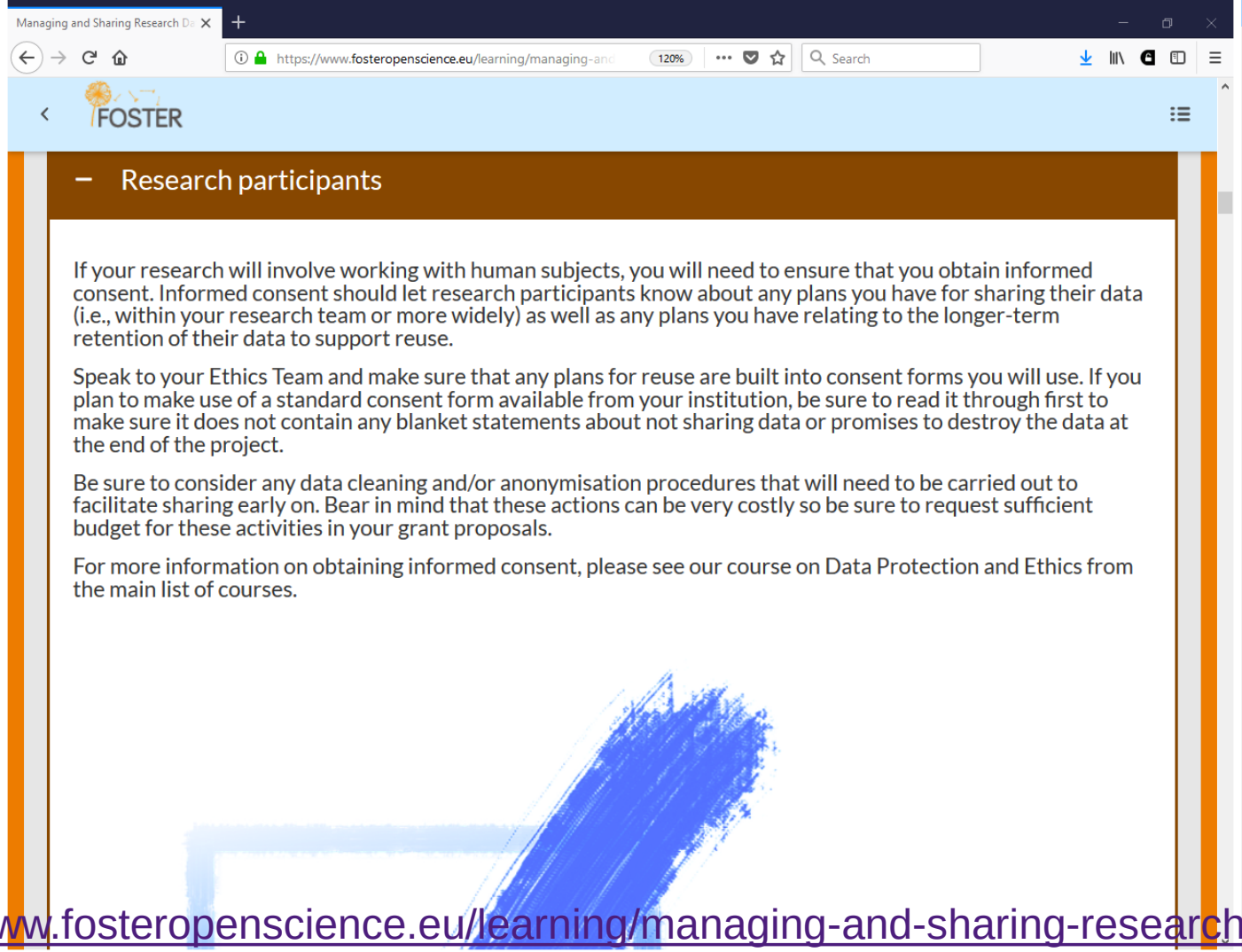

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− Research collaborators

If you are involved in a collaborative research project - either with other academic institutions, industry partners, or citizen science - you will need to make sure that your partners agree to data sharing. This should be clarified during the idea stage of your project and built into any consortium agreements that are developed to govern your project. Your Grants or Contracts Team should be able to help you. Bear in mind that your partners may only agree to sharing particular datasets and request that others are kept confidential. It is a good idea to make any such restrictions clear in your research proposal. You should also agree at which point during the life of the project the selected datasets will be shared and with whom, and document these decisions so that all partners have a clear idea of what will happen and when.

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− Research data infrastructure

As you are planning your research, consider which research data infrastructure you will use to make the data accessible and who will need access. It can be tempting to make use of Google docs or Drobox to easily share data with collaborators during the active stage of the project. However, be sure to consider whether you will be working with any personally or commercially sensitive data. If so, these are not the best options for secure data sharing. It is always a good idea to spend some time with your Information Services Team to find out what data sharing infrastructure they can support in-house. In most cases, managed infrastructure provided by your institution will provide better security and back-up and can often be made accessible to collaborators from other institutions. Be sure to discuss the scale and format(s) of the data you anticipate sharing and also consider how frequently access will be required (daily, monthly, annually). These aspects will inform the best storage and sharing options for your data during the life of your project and beyond.

https://www.fosteropenscience.eu/learning/managing-and-sharing-research-data

https://www.fosteropenscience.eu/learning/managing-and-sharing-research-data

− Research data repositories

When selecting a repository for those data selected for longer-term retention and sharing, be sure to check that the repository meets your needs. For instance, if your data will only be shared with a specific research community you will need to ensure that the repository can provide a means of allowing researchers to request access and to be authenticated.

Most data repositories have policies outlining any limits relating to the size of data deposit or restrictions on formats they will accept. Be aware of any normalisation processes that are undertaken by the repository (i.e., when deposited data are migrated to preferred formats). In many cases, normalisation can affect the usability of the data. For example, if an Excel spreadsheet that was presented in a publication is saved as a PDF, it will be available as a record of what was presented in the article but will lose much of the functionality needed to support validation and reuse. For instance, any formulas applied to individual cells within the spreadsheet will be lost. It will also mean that reuse of the data is more difficult and would require re-keying the data into a new spreadsheet.

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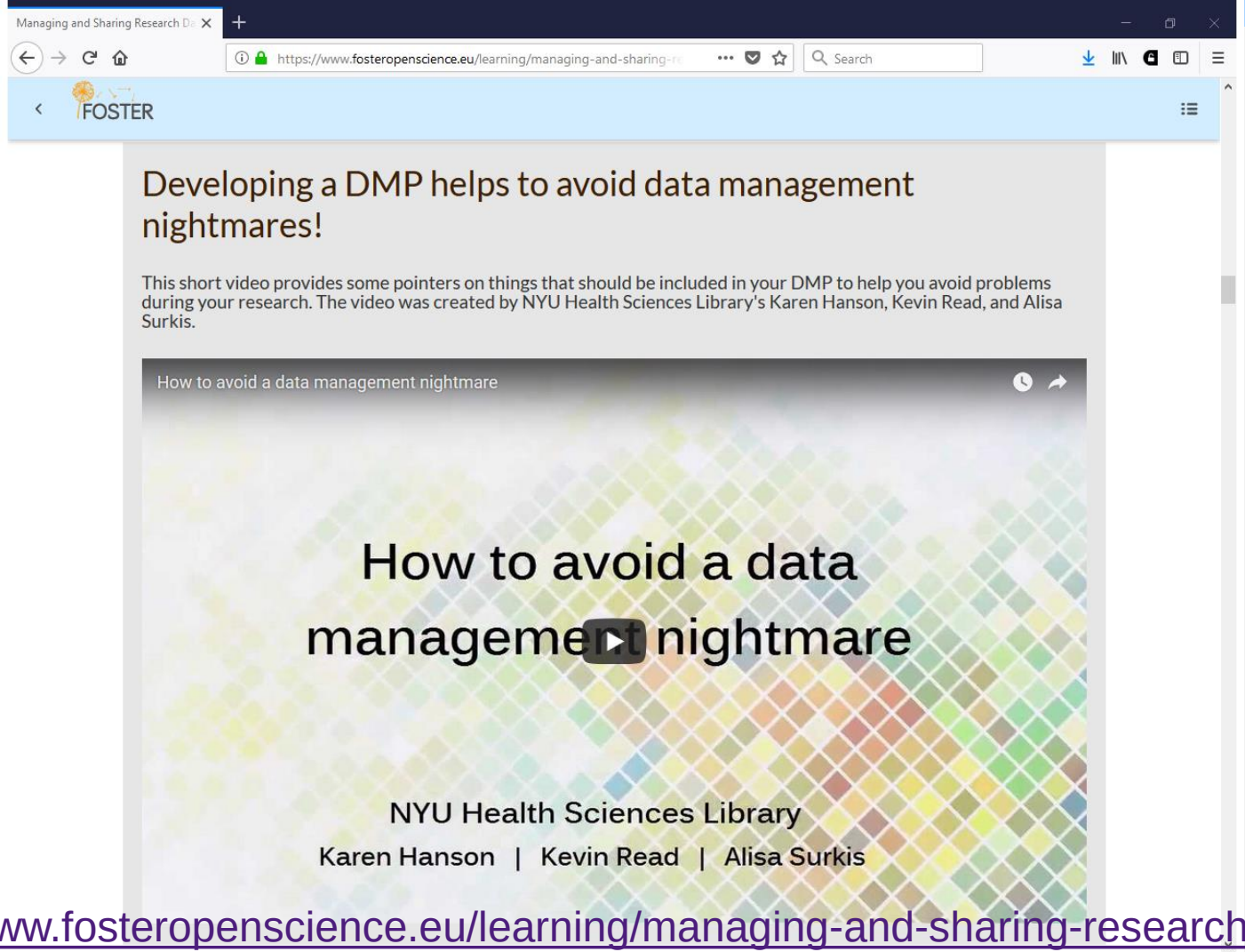
− Secondary data reusers

If you have concerns that your data will be misused and this is putting you off sharing, bear in mind that you can still make the data accessible while requesting that potential reusers accept general terms and conditions regarding fair use. For example, you may request that researchers wishing to reuse the data tick a box indicating that they will not attempt to identify anonymised participants. The UK Data Service End User License (EUL) provides an example of how this approach is put into practice for a national data archive.



https://www.fosteropenscience.eu/learning/managing-and-sharing-research-data

A DMP is about ‘keeping’ data

- Storing data < > archiving data
- Archived data < > findable data
- Findable < > accessible
- Accessible < > understandable
- Understandable < > usable

- A USB stick is not safe
- A persistent ID is essential but no guarantee for usability
- Data in a proprietary format is not sustainable

How to deal with data and context?

Versioning, back-up, storage and archiving

- During the project and in the long term

Ethics, consent forms, legal access

Security and technical access

Usage licences

What should be preserved and shared?

- The data needed to validate results in scientific publications (minimally!).
- The associated metadata: the dataset's creator, title, year of publication, repository, identifier etc.
  - Follow a metadata standard in your line of work, or a generic standard, e.g. Dublin Core or DataCite, and be FAIR.
  - The repository will assign a persistent ID to the dataset: important for discovering and citing the data.

What should be preserved and shared? (2)

- Documentation: code books, lab journals, informed consent forms – domain-dependent, and important for understanding the data and combining them with other data sources.
- Software, hardware, tools, syntax queries, machine configurations – domain-dependent, and important for using the data. (Alternative: information about the software etc.)

Basically, everything that is needed to replicate a study should be available. Plus everything that is potentially useful for others.

Data description examples

The final dataset will include self-reported demographic and behavioural data from interviews with the subjects and laboratory data from urine specimens provided.

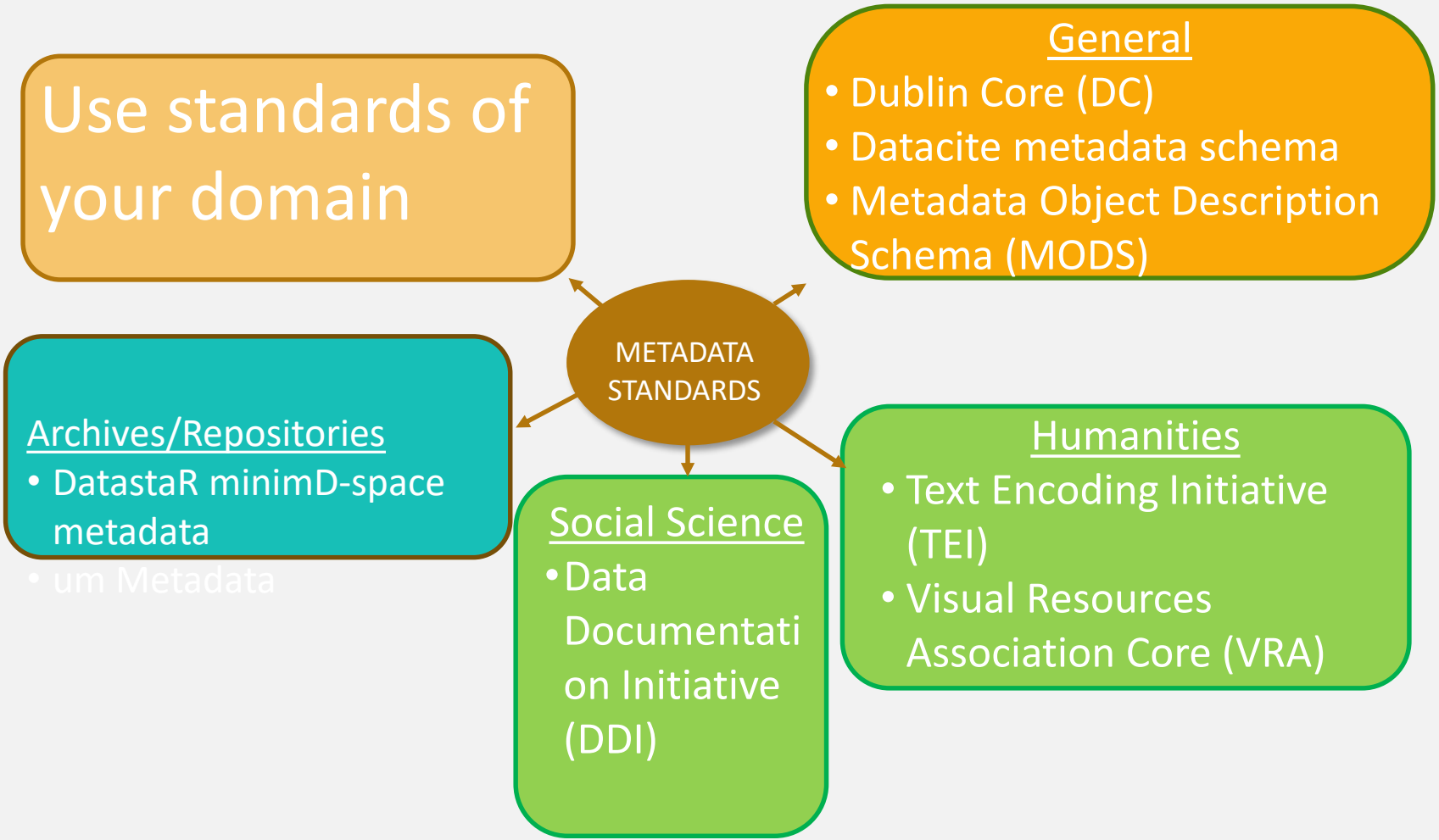
From NIH data sharing statements

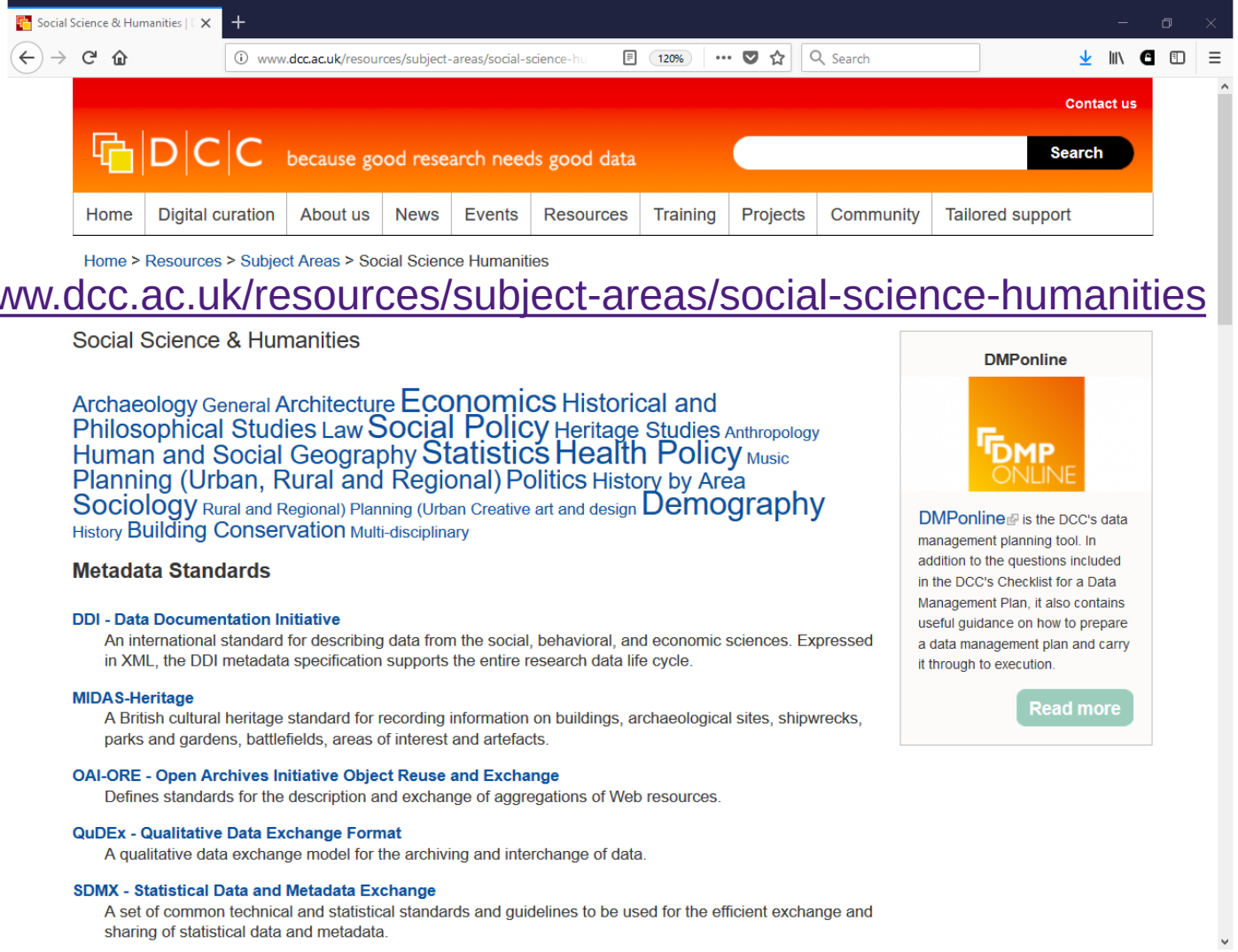
Metadata examples

Metadata will be tagged in XML using the Data Documentation Initiative (DDI) format. The codebook will contain information on study design, sampling methodology, fieldwork, variable-level detail, and all information necessary for a secondary analyst to use the data accurately and effectively.

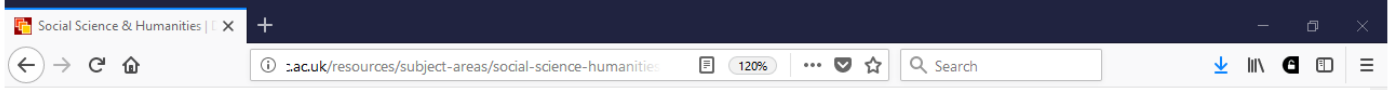
From ICPSR Framework for Creating a DMP

Use standards of your domain





http://www.dcc.ac.uk/resources/subject-areas/social-science-humanities



Extensions

CARARE metadata schema
An application profile of the MIDAS Heritage standard intended for delivering metadata to the CARARE service environment about an organisation's online collections, monument inventory database and digital objects.

CESSDA MLI - Council of European Social Science Data Archives Minimum Level of Information
A common base profile of DDI for use by the member archives of CESSDA.

GESMES/TS - GEneric Statistical MESsage for Time Series
An extension of SDMX used to exchange statistical data and metadata.

Tools

DDI on Rails
Server-side software for building a data portal, with a particular focus on survey datasets. It uses DDI to provide access to the data at the level of concepts and variables. For an example of it in use, see the SOEPinfo data portal.

DDI Tools
The Data Documentaion Initiative website's list of tools to implement the DDI standard.

FISH Interoperability Toolkit
A suite of tools using the MIDAS Heritage metadata standard to facilitate the process of moving information between the wide variety of information systems used to record the historic environment.

Istat SDMX Framework Project
A suite of tools for managing data and metadata in SDMX.

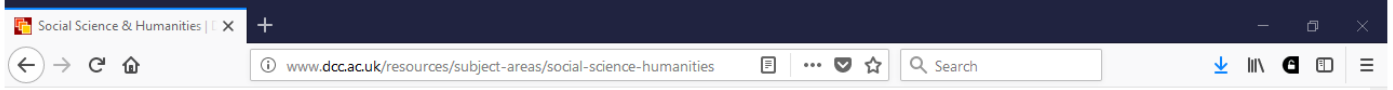
SDMX Editor
A simple tool for managing and accessing statistical metadata, using the SDMX framework.

SDMX Mapping Assistant
A tool to facilitate the mapping between the structural metadata provided by an SDMX-ML Data Structure Definition and those that reside in a database of a dissemination environment.

SDMX Tool Repository
A list of software tools supporting the SDMX standard.

Use Cases

http://www.dcc.ac.uk/resources/subject-areas/social-science-humanities



Use Cases

CESSDA Catalogue
Provides a seamless interface to datasets from social science data archives across Europe using the CESSDA MLI profile of DDI.

DDI Projects
The Data Documentation Initiative website's list of projects adopting or encouraging DDI as a standard.

DDI Use Case Literature
Links to DDI 3 use case papers, which were the outcomes of a workshop held at the Schloss Dagstuhl - Leibniz Center for Informatics in Wadern, Germany, November 2-6, 2009.

English Heritage Listed Buildings System
A case study of the use of the MIDAS XML Monument schema as a vehicle for storing data exported from a major heritage sector information system, the English Heritage Listed Building System (LBS).

Eurostat
The statistical office of the European Union, which implementats SDMX in a number of projects.

ICPSR - Inter-university Consortium for Political and Social Research
A data archive providing leadership and training in data access, curation, and methods of analysis for the social science research community; all metadata conforms to the DDI standard.

Open Archives Inititative
Develops and promotes interoperability standards that aim to facilitate the efficient dissemination of content.

SDMX Implementations
The SDMX website's list of current and planned practical implimentations from national and international organisations.

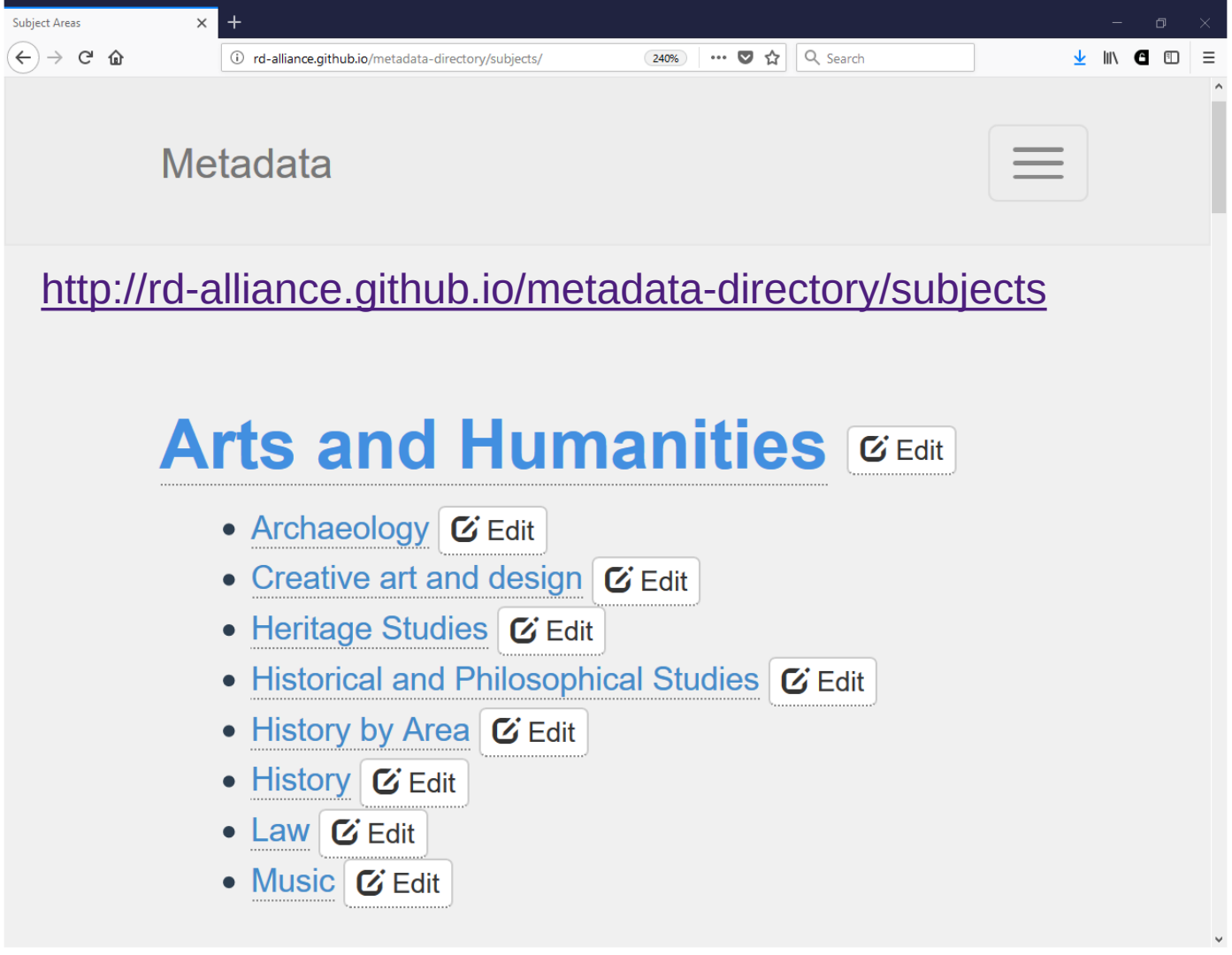
The Centre for Digital Music Research Data Repository
Used by researchers at C4DM to share their research data with their colleagues and others in the digital music research community, this repository uses the DataCite metadata schema to describe its holdings.

The Institution for Social and Policy Studies (ISPS) Data Archive
Provides members of the scholarly community with access to files associated with scholarly studies for the purpose of replication, for all studies conducted by ISPS-affiliated researchers. ISPS metadata records conform to DDI requirements and include a minimal set of Dublin Core metadata elements.

UK ADS - UK Archeology Data Service
The ADS collects, catalogues, manages, preserves, and encourages re-use of digital resources created by archaeologists. It promotes good practice in the use of digital data in archaeology, provides technical advice to the research community, and supports the deployment of digital technologies. Its catalogue records are based on Dublin Core.

UKDA - UK Data Archive
Curator of the largest collection of digital data in the social sciences and humanities in the United Kingdom, the archive uses DDI as the basis for its catalogue records.

http://www.dcc.ac.uk/resources/subject-areas/social-science-humanities


Subject Areas
rd-alliance.github.io/metadata-directory/subjects/
240%
Search
Metadata
http://rd-alliance.github.io/metadata-directory/subjects
Arts and Humanities
Edit
Archaeology
Edit
Creative art and design
Edit
Heritage Studies
Edit
Historical and Philosophical Studies
Edit
History by Area
Edit
History
Edit
Law
Edit
Music
Edit

Social and Behavioral Sciences Edit

- Anthropology Edit
- Demography Edit
- Economics Edit
- Geography Edit
- Health Policy Edit
- Human and Social Geography Edit
- Planning (Urban, Rural and Regional) Edit
- Politics Edit
- Sociology Edit

http://rd-alliance.github.io/metadata-directory/subjects

Data sharing examples

The videos will be made available via the bristol.ac.uk website (both as streaming media and downloads) HD and SD versions will be provided to accommodate those with lower bandwidth. Videos will also be made available via Vimeo, a platform that is already well used by research students at Bristol. Appropriate metadata will also be provided to the existing Vimeo standard.

All video will also be available for download and re-editing by third parties. To facilitate this Creative Commons licenses will be assigned to each item. In order to ensure this usage is possible, the required permissions will be gathered from participants (using a suitable release form) before recording commences.

From University of Bristol Kitchen Cosmology DMP

We will make the data and associated documentation available to users under a **data-sharing agreement** that provides for: (1) a commitment to using the data only for research purposes and not to identify any individual participant; (2) a commitment to securing the data using appropriate computer technology; and (3) a commitment to destroying or returning the data after analyses are completed.

From NIH data sharing statements

Examples restrictions

Because the STDs being studied are reportable diseases, we will be collecting identifying information. Even though the final dataset will be stripped of identifiers prior to release for sharing, we believe that there remains the possibility of deductive disclosure of subjects with unusual characteristics. Thus, we will make the data and associated documentation available to users only under a data-sharing agreement.

From NIH data sharing statements

Examples restrictions (2)

1. Share data privately within 1 year.
   Data will be held in Private Repository, but metadata will be public
2. Release data to public within 2 years.
   Encouraged after one year to release data for public access.
3. Request, in writing, data privacy up to 4 years.
   Extensions beyond 3 years will only be granted for compelling cases.
4. Consult with creators of private CZO datasets prior to use.
   Pis required to seek consent before using private data they can access

From Boulder Creek Critical Zone Observatory DMP

Archiving examples

The investigators will work with staff at the UKDA to determine what to archive and how long the deposited data should be retained. Future long-term use of the data will be ensured by placing a copy of the data into the repository.

From ICPSR Framework for Creating a DMP

Data will be provided in file formats considered appropriate for long-term access, as recommended by the UK Data Service. For example, SPSS Portal forat and tab-delimited text for qualitative tabular data and RTF and PDF/A for interview transcripts. Appropriate documentation necessary to understand the data will also be provided. Anonymised data will be held for a minimum of 10 years following project completion, in compliance with LSHTM's Records Retention and Disposal Schedule. Biological samples (output 3) will be deposited with the UK BioBank for future use.

From Writing a Wellcome Trust Data Management and Sharing Plan

Sharing data: what is meant?

With collaborators
while research is active

Dropbox

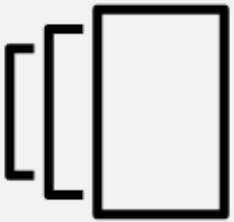
Data are mutable

(Open) data sharing

Data are stable,
searchable, citable,
clearly licensed

Storing data: what is meant?

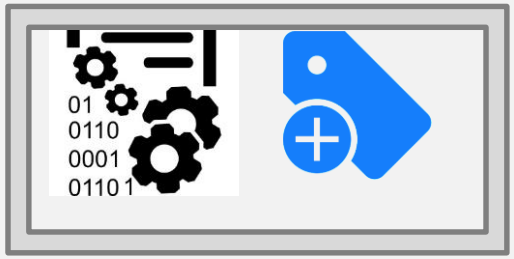
Storing and backing up files while research is active



Likely to be on a networked filestore or hard drive

Easy to change or delete

Archiving or preserving data in the long-term



Likely to be deposited in a digital repository

safeguarded and preserved

Archiving, repositories, ehm?

Select a data repository that will preserve your data, metadata and possibly tools in the long term.

It is advisable to contact the repository of your choice when writing the first version of your DMP.

Repositories may offer guidelines for sustainable data formats and metadata standards, as well as support for dealing with sensitive data and licensing.

Where to find a repository?

More information: https://www.openaire.eu/opendatapilot-repository

Zenodo: http://www.zenodo.org

Re3data.org: http://www.re3data.org

How to select a repository?

Main criteria for choosing a data repository:

Certification as a ‘Trustworthy Digital Repository’, with an explicit ambition to keep the data available in the long term.

- Three common certification standards for TDRs:

Data Seal of Approval: http://datasealofapproval.org/en
nestor seal: http://www.langzeitarchivierung.de/Subsites/nestor/EN/nestor-Siegel/siegel_node.html
ISO 16363: http://www.iso16363.org

How to select a repository? (2)

- Matches your particular data needs: e.g. formats accepted; mixture of Open and Restricted Access.

- Provides guidance on how to cite the data that has been deposited.

- Gives your submitted dataset a persistent and globally unique identifier: for sustainable citations – both for data and publications – and to link back to particular researchers and grants. www.openaire.eu/opendatapilot-repository

Zenodo (OpenAIRE/CERN repository)

www.zenodo.org

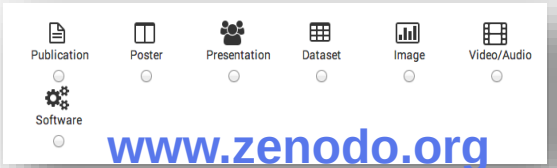
Zenodo Repository

Multiple data types

- Publications
- Long tail of research data

Citable data (DOI)

Links to funding, pubs, data, software



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Drag and drop files here

— or —

Choose files

(minimum 1 file required, max per dataset - contact us for larger datasets)

Upload type required

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May 18, 2018 (v2) | Dataset | Open Access

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Historical climate model output of ECHAM5-wiso from 1871-2011 at T106 resolution

Nathan J. Steiger

Historical climate model simulation of the isotope-enabled ECHAM5-wiso model from the years 1871 to 2011 at T106 (1 degree) resolution. The model code was provided by Martin Werner of AWI. The simulations were designed and run by Nathan Steiger on the Yellowstone supercomputer. The boundary...

Uploaded on May 18, 2018

1 more version(s) exist for this record

May 11, 2018 (v4) | Dataset | Open Access

View

A global network of biomedical relationships derived from text

Percha, Bethany; Altman, Russ B.

This repository contains labeled, weighted networks of chemical-gene, gene-gene, gene-disease, and chemical-disease relationships based on single sentences in PubMed abstracts. All raw dependency paths are provided in addition to the labeled relationships. PART I: Connects dependency paths to...

Uploaded on May 12, 2018

3 more version(s) exist for this record

May 8, 2018 (v1) | Presentation | Open Access

View

Software Citation and the Wikidata Ecosystem

Thornton, Katherine

Slides for a presentation to the Force2017 Software Citation Implementation Working Group describing software and file format data in Wikidata and data validation using ShEx.

Uploaded on May 8, 2018

April 13, 2018 (v1.0.1) | Software | Open Access

View

Zenodo now supports DOI versioning!

Read more about it, in our newest blog post.

Using GitHub?

Just Log in with your GitHub account and click here to start preserving your repositories.

Zenodo in a nutshell

- **Research. Shared.** — all research outputs from across all fields of research are welcome! Sciences and Humanities, really!
- **Citeable. Discoverable.** — uploads gets a Digital Object Identifier (DOI) to make them easily and uniquely citeable.
- **Communities** — create and curate your own community for a workshop, project, department, journal, into which you can accept or reject uploads. Your own complete digital repository!
- **Funding** — identify grants, integrated in reporting lines for research funded by the European Commission via OpenAIRE.
- **Flexible licensing** — because not everything is under Creative Commons.
- **Safe** — your research output is stored safely for the future in the same cloud infrastructure as CERN's own LHC research data.

Read more about Zenodo and its features

May 18, 2018

Dataset Open Access

Historical climate model output of ECHAM5-wiso from 1871-2011 at T106 resolution

Nathan J. Steiger

Historical climate model simulation of the isotope-enabled ECHAM5-wiso model from the years 1871 to 2011 at T106 (1 degree) resolution. The model code was provided by Martin Werner of AWI. The simulations were designed and run by Nathan Steiger on the Yellowstone supercomputer. The boundary conditions were interpolated HadISST fields. The simulations also included updated fractionation factors (an option within the ECHAM5-wiso Fortran code). All variables here are at monthly resolution in netcdf format. Please contact Nathan Steiger if you have any questions about the simulation. In addition to the data citation, please also cite the following reference for where the data were first published: Steiger, N.J., E.J. Steig, S.G. Dee, G.H. Roe, and G.J. Hakim, (2017): ***Climate reconstruction using data assimilation of water-isotope ratios from ice cores.*** Journal of Geophysical Research: Atmospheres, doi:10.1002/2016JD026011.

Standard variables include: ECHAM5 T106 orography, 2 m temperature, surface pressure, mean sea level pressure, vertically integrated water vapor, total precipitation, evaporation, soil moisture, relative humidity, specific humidity, atmospheric stream function at 200 hPa, geopotential height at 500 hPa, windspeed at 10 m, and u-velocity wind at 200 hPa. Moisture variables are given at the surface (lowest atmospheric level).

Isotope variables include: d18O and dD of total precipitation, d18O and dD of evaporation, d18O and dD of snow fall, d18O and dD of seasonal snow cover, d18O and dD of snow on glaciers, d18O and dD of soil moisture, and specific humidity of water isotopes.

Version 2 includes additional model output.

Files (9.0 GB)

Name	Size	
d18O_glaciersnow_mon_1871_2011.nc md5:dbdb2e897cddbf2ee05128ed58359db7	346.5 MB	Download
d18O_precip_mon_1871_2011.nc md5:759f8bfbf0a6001589a76c6196dd73fb	346.5 MB	Download

Indexed in OpenAIRE

Publication date:
May 18, 2018

DOI:
DOI 10.5281/zenodo.1249604

Keyword(s):
climate model | ECHAM5-wiso | water isotopes | historical climate simulation | paleoclimate | climate reconstruction | proxy system model

Communities:
Zenodo

License (for files):
Creative Commons Attribution 4.0

Versions

Version 2	10.5281/zenodo.1249604	May 18, 2018
Version 1	10.5281/zenodo.1041751	Nov 3, 2017

Cite all versions? You can cite all versions by using the DOI 10.5281/zenodo.1041750. This DOI represents all versions, and will always resolve to the latest one. Read more.

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Nathan J. Steiger. (2018). Historical climate model output of ECHAM5-wiso from 1871-2011 at T106 resolution [Data set]. Zenodo. http://doi.org/10.5281/zenodo.1249604

Start typing a citation style...

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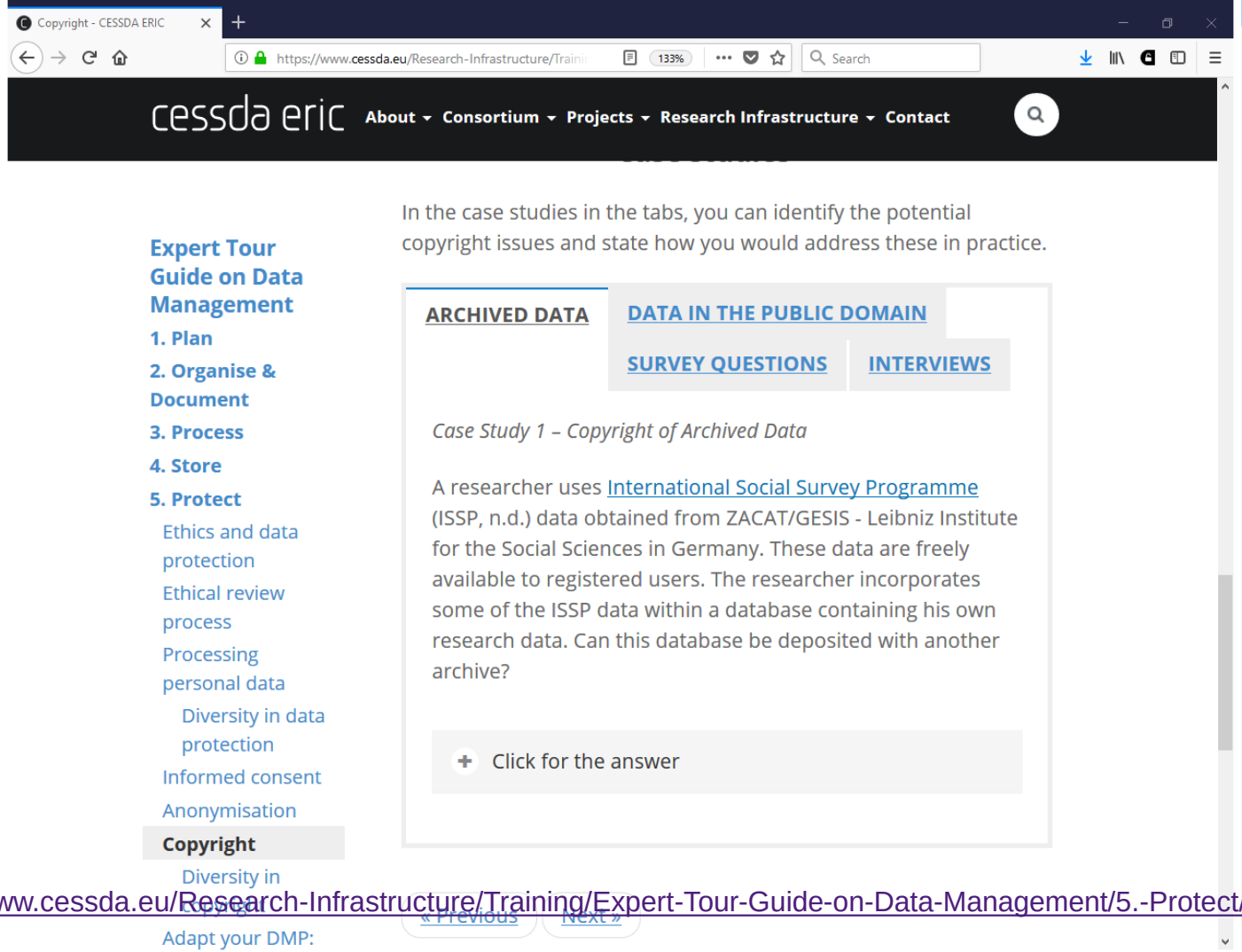
BibTeX CSL DataCite Dublin Core JSON JSON-LD MARCXML Mendeley



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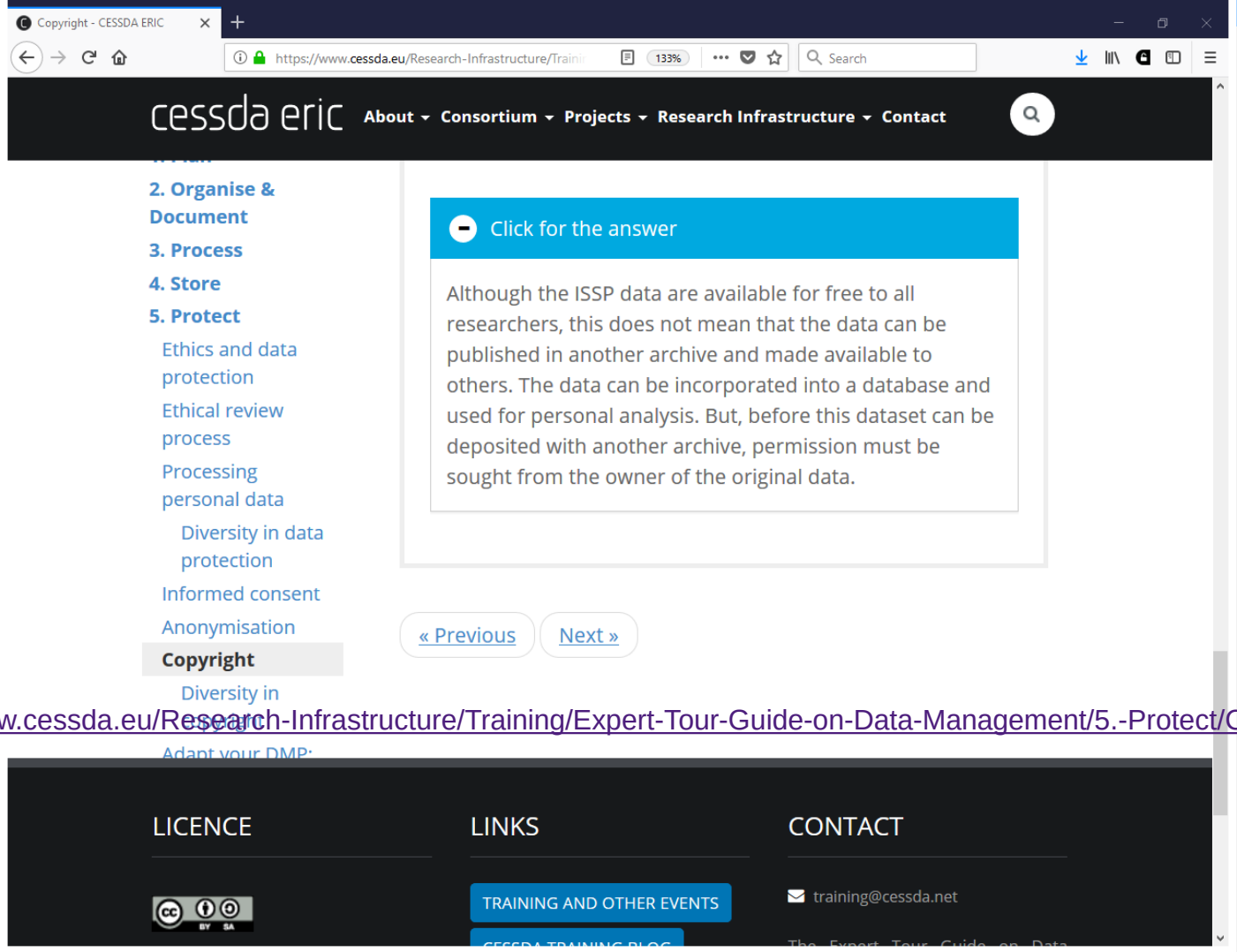

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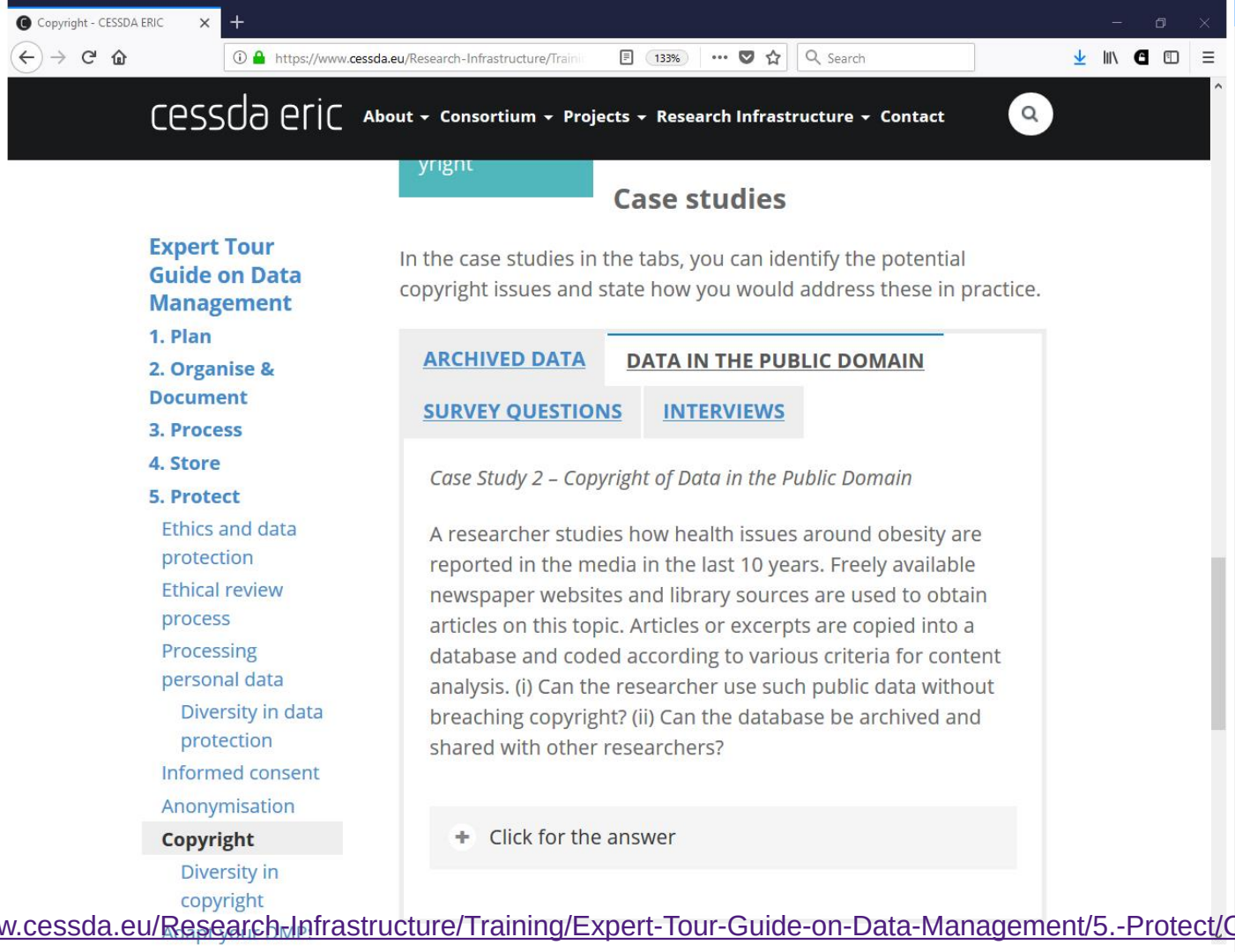

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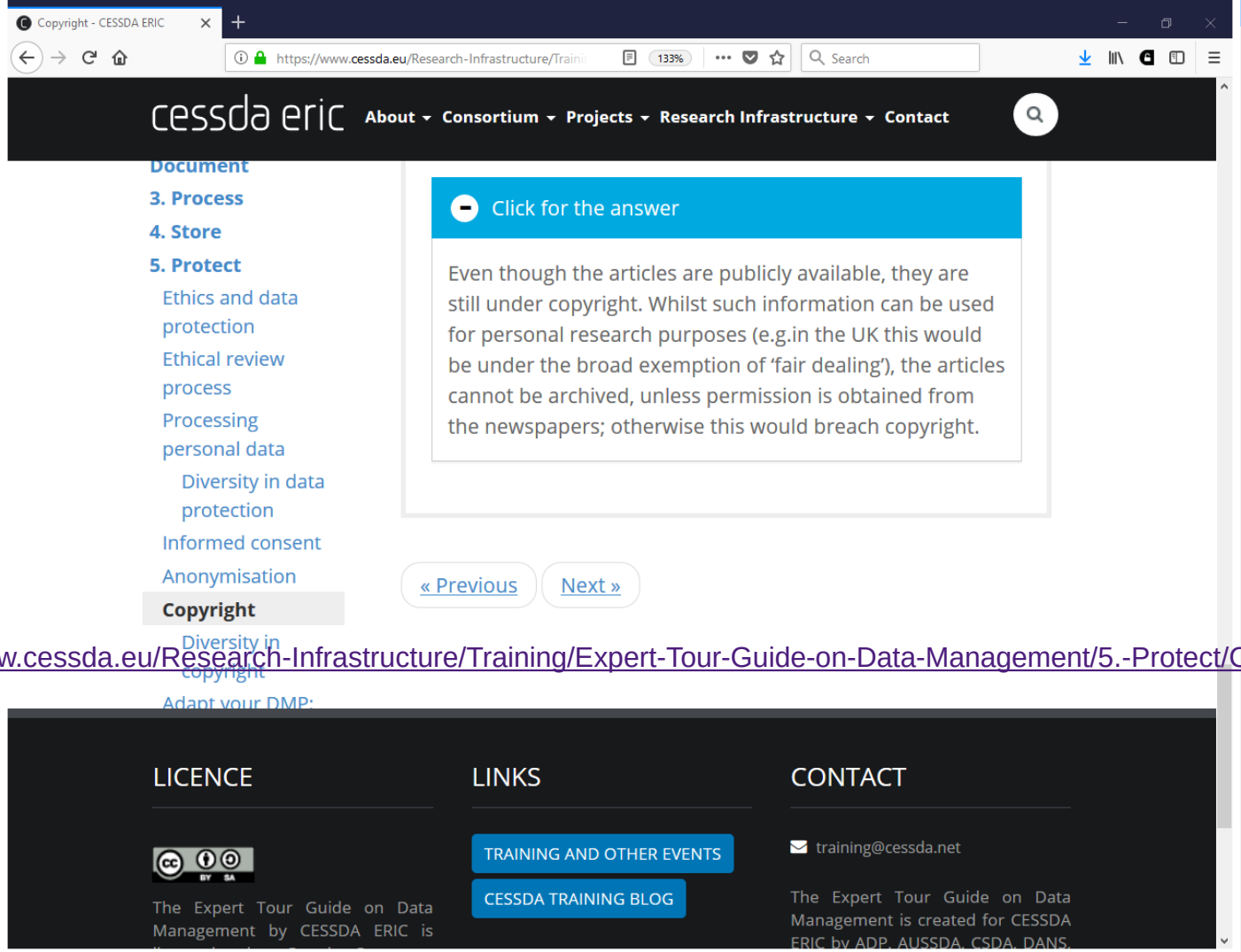

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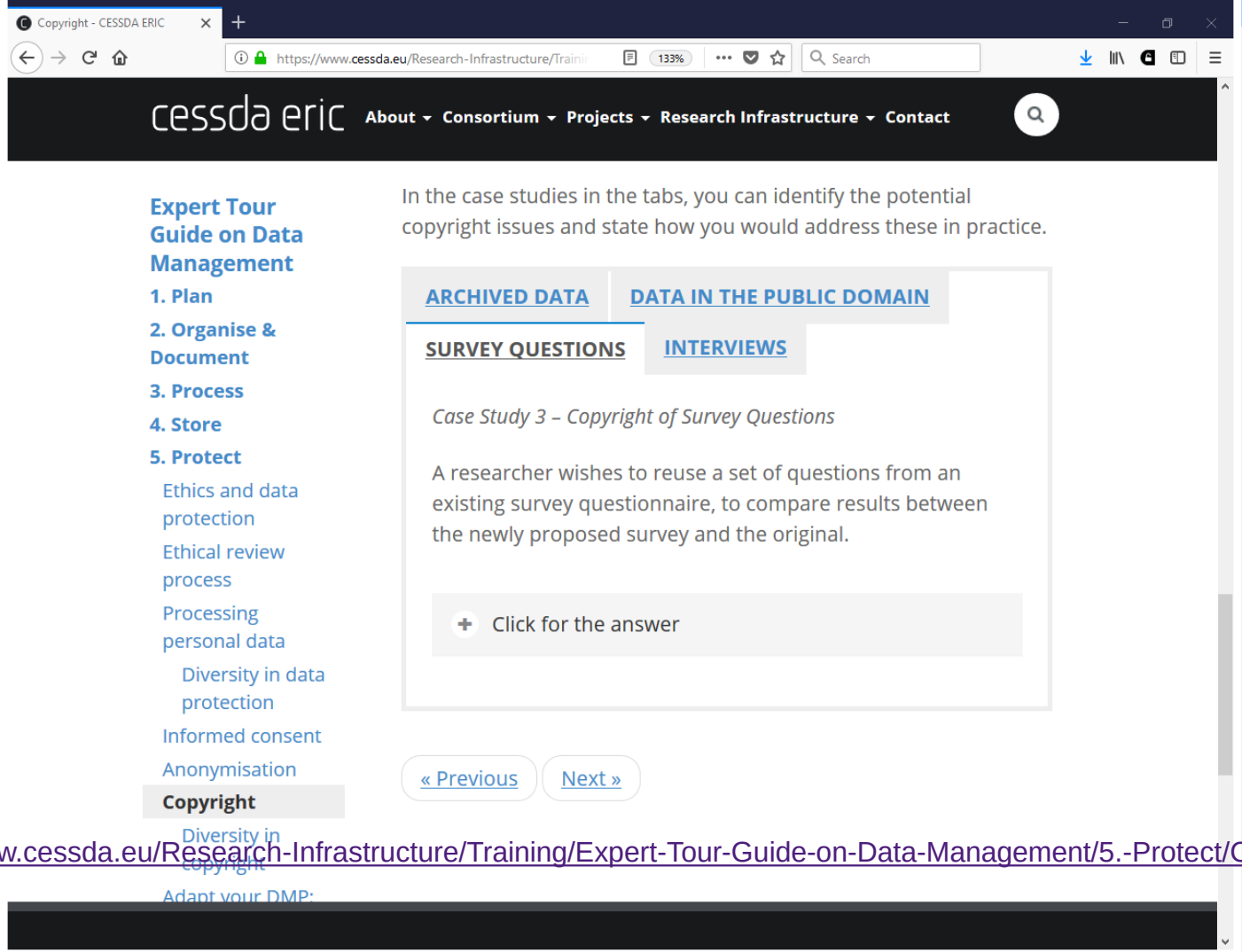

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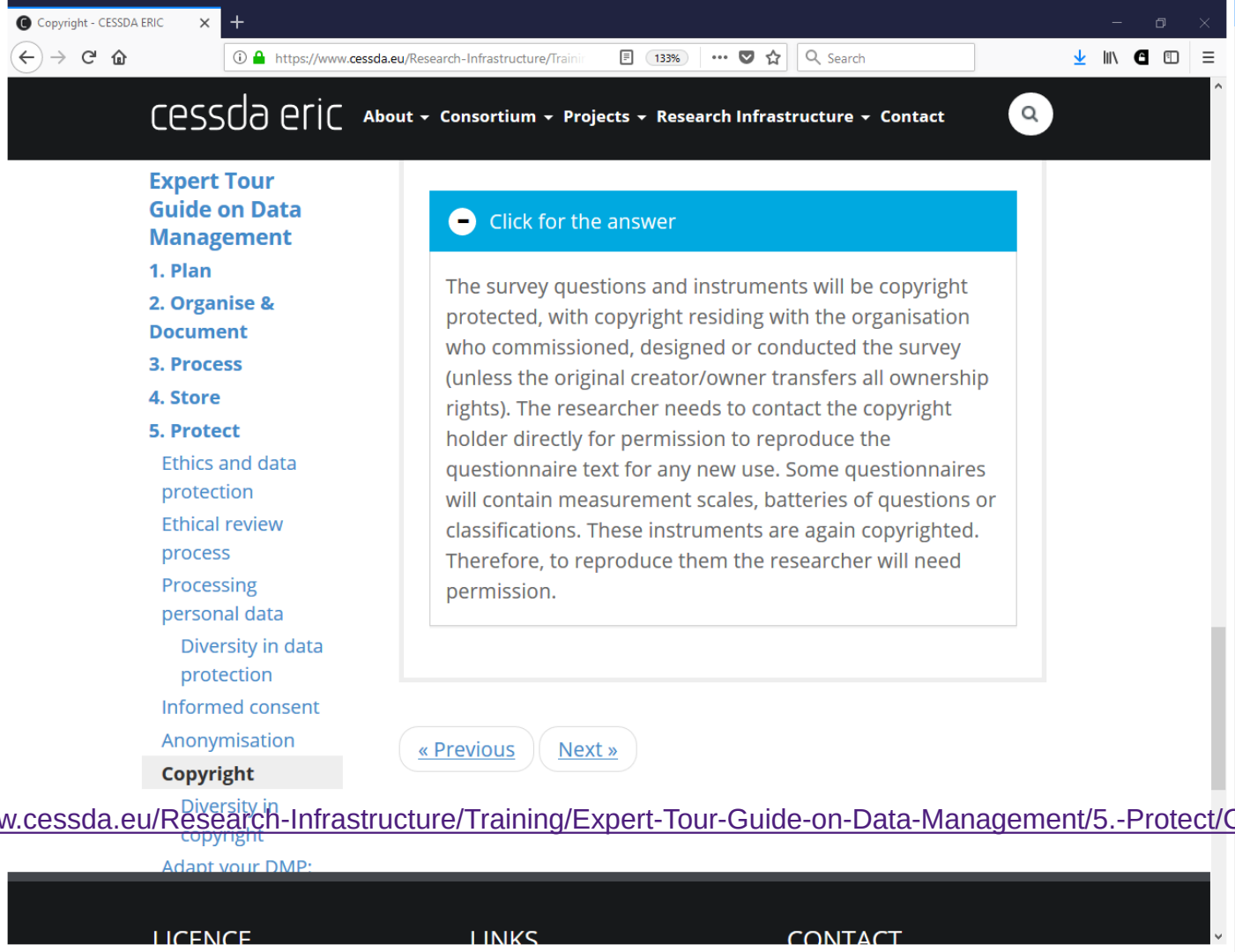

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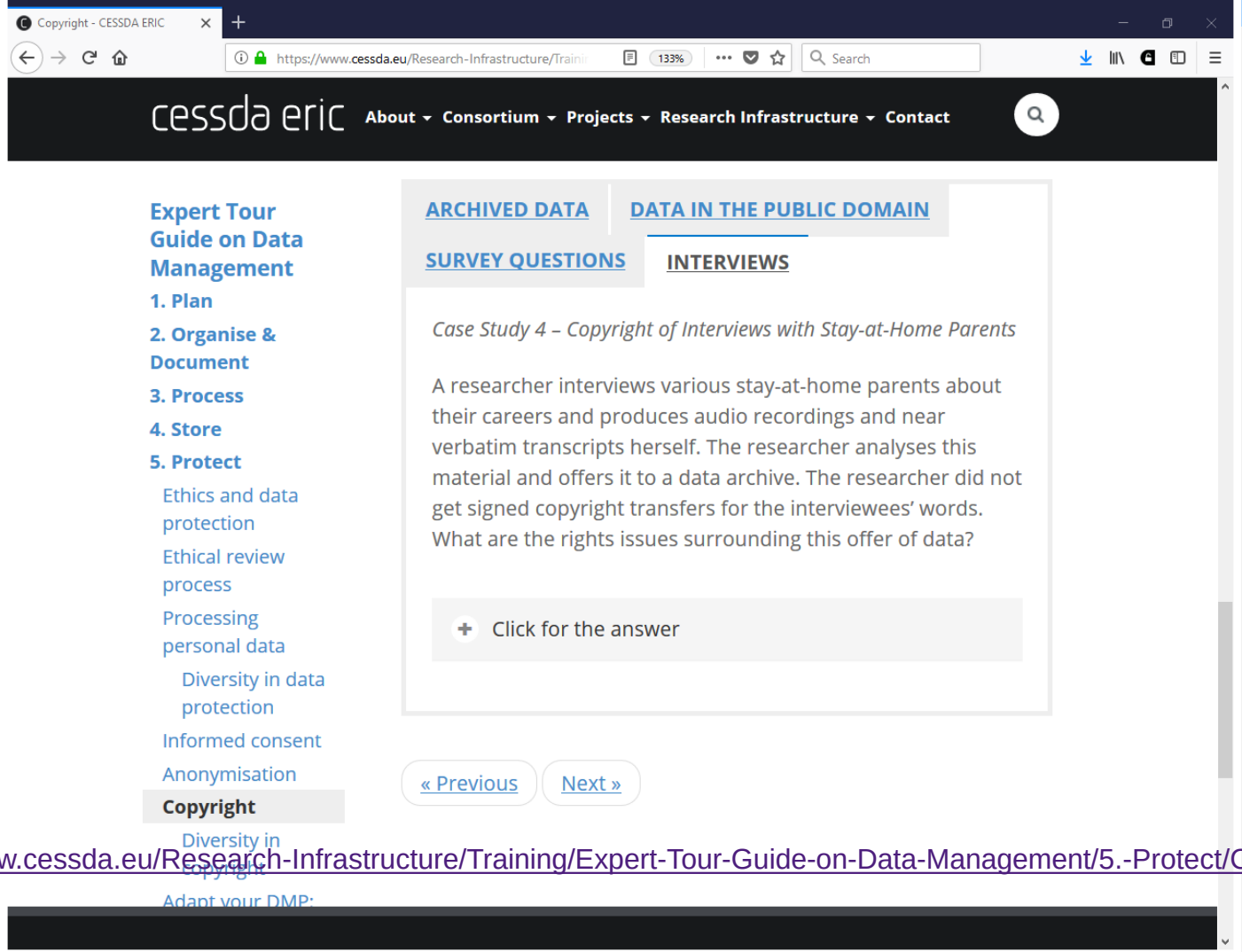

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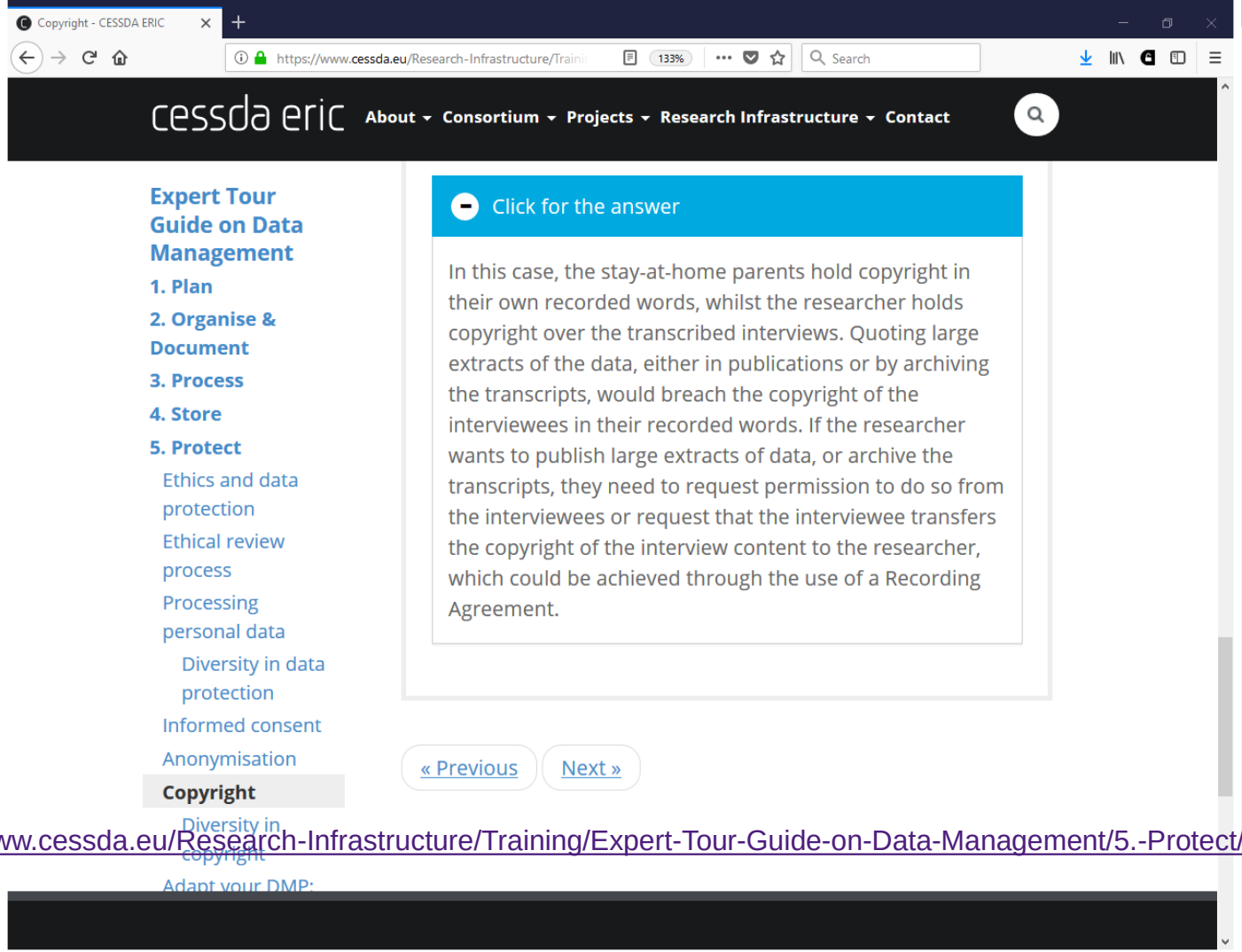

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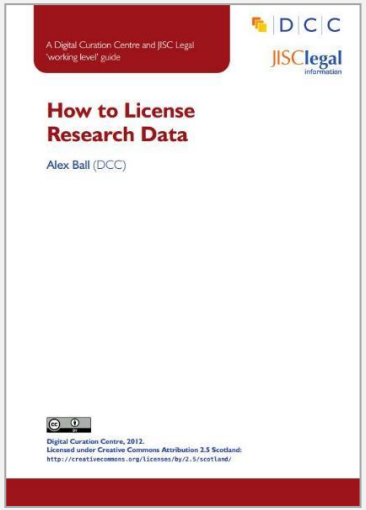
Licensing research data



Horizon 2020 Open Access guidelines point to:

CC ZERO or CC BY

This DCC guide outlines the pros and cons of each approach and gives practical advice on how to implement your licence

CREATIVE COMMONS LIMITATIONS

NC Non-Commercial
What counts as commercial?

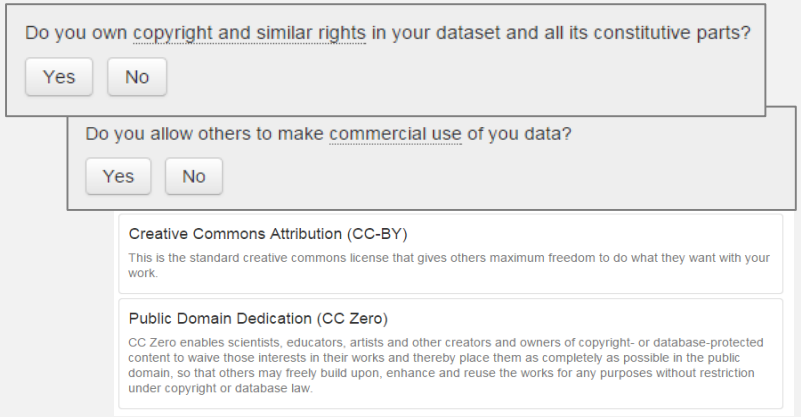
ND No Derivatives
Severely restricts use

These clauses are not open licenses

www.dcc.ac.uk/resources/how-guides/license-research-data

EUDAT licensing tool

Answer questions to determine which licence(s) are appropriate to use



http://ufal.github.io/public-license-selector

https://www.fosteropenscience.eu/content/research-ethics-and-legal-compliance-informed-consent-and-data-licensing

Examples of DMP questions and answers

For inspiration of filled in DMPs look at some example DMPs we prepared. Both DMPs are based on a fictional research project with a basis in reality. For each topic of the DMP, there are example questions and answers where applicable. The examples are not country specific. Some of the information is generic.

Qualitative data

During this project, in-depth interviews with teachers in primary school will be held. The project has just started.
Click the link to view and download the DMP:

DMPQuestionsQualitativeData.pdf (165 KB)

Quantitative data

The project concerns a survey which is conducted in order to identify how the evolution of society affects attitudes and behaviour. The project is still running.
Click the link to view and download the DMP:

DMPQuestionsQuantitativeData.pdf (205 KB)

https://www.cessda.eu/Research-Infrastructure/Training/Expert-Tour-Guide-on-Data-Management/1.-Plan/Adapt-your-DMP-Part-1

Managing and Sharing Research Da

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Discipline specific examples of real DMPs

Here are a few examples of data management plans (DMPs) that have been produced by projects in the Arts and Humanities, Social Sciences, and Life Sciences. For more examples of DMPs, please see the DCC website.

H2020 FREME Project

A DMP from the Arts and Humanities

The H2020 supported FREME project is an open framework of e-services for multilingual and semantic enrichment of digital content project. The project has shared version one of their DMP as a public deliverable.

https://www.fosteropenscience.eu/learning/managing-and-sharing-research-data

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Discipline specific examples of real DMPs

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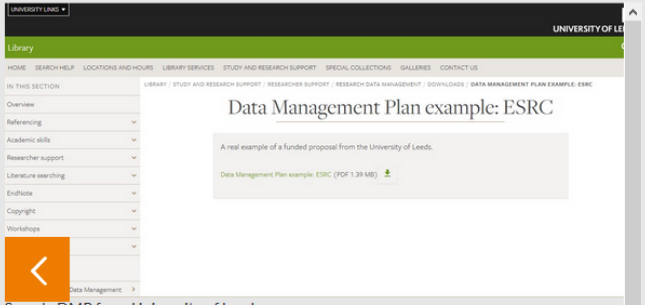

Sample DMP from University of Leeds

A DMP from the Social Sciences

This DMP was developed and shared by PI Andrea Holomotz, University of Leeds for her Economic and Social Research Council (ESRC) funded project 'Realist Evaluation of Adapted Sex Offender Treatment Programs for Men with Intellectual Disability'. The DMP covers the management of quantitative and qualitative data, including audio interviews. The plan discusses ethical issues around a very sensitive dataset, including using consent and anonymisation to generate data which can be shared and reused. It was shared by the University of Leeds.

https://www.fosteropenscience.eu/learning/managing-and-sharing-research-data

Guidelines on DMPs

How to develop a DMP www.dcc.ac.uk/resources/how-guides/develop-data-plan

RDM brochure and template
https://dans.knaw.nl/en/about/organisation-and-policy/information-material?set_language=en

OpenAIRE guidelines www.openaire.eu/opendatapilot-dmp

ICPSR framework for a DMP
www.icpsr.umich.edu/icpsrweb/content/datamanagement/dmp/framework.html

Other resources

Where to keep research data http://www.dcc.ac.uk/resources/how-guides-checklists/where-keep-research-data/where-keep-research-data

Five steps to decide what data to keep http://www.dcc.ac.uk/resources/how-guides/five-steps-decide-what-data-keep

Re3data http://www.re3data.org/

Figshare https://figshare.com/

Genbank https://www.ncbi.nlm.nih.gov/genbank/

How to write a lay summary http://www.dcc.ac.uk/resources/how-guides/write-lay-summary

Lay summaries https://www.bhf.org.uk/research/information-for-researchers/how-to-apply/lay-summaries

With thanks to

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