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EKT
NATIONAL DOCUMENTATION CENTRE

Open Access & Data Management in Horizon 2020

18 & 19 October 2018

FOSTER

How to manage your data to make them open and FAIR

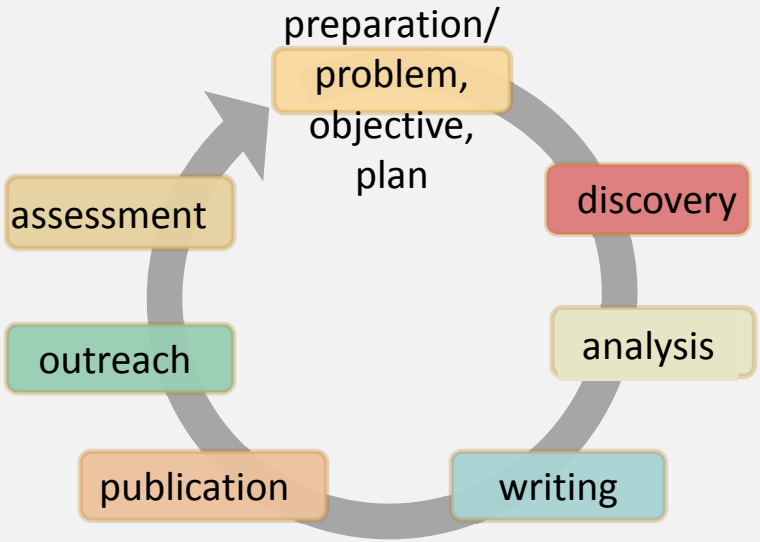
Iryna Kuchma, EIFL Open Access Programme Manager, @irynakuchma

Health NCP Net 2.0 Training Open Access & Data Management in Horizon 2020, EKT

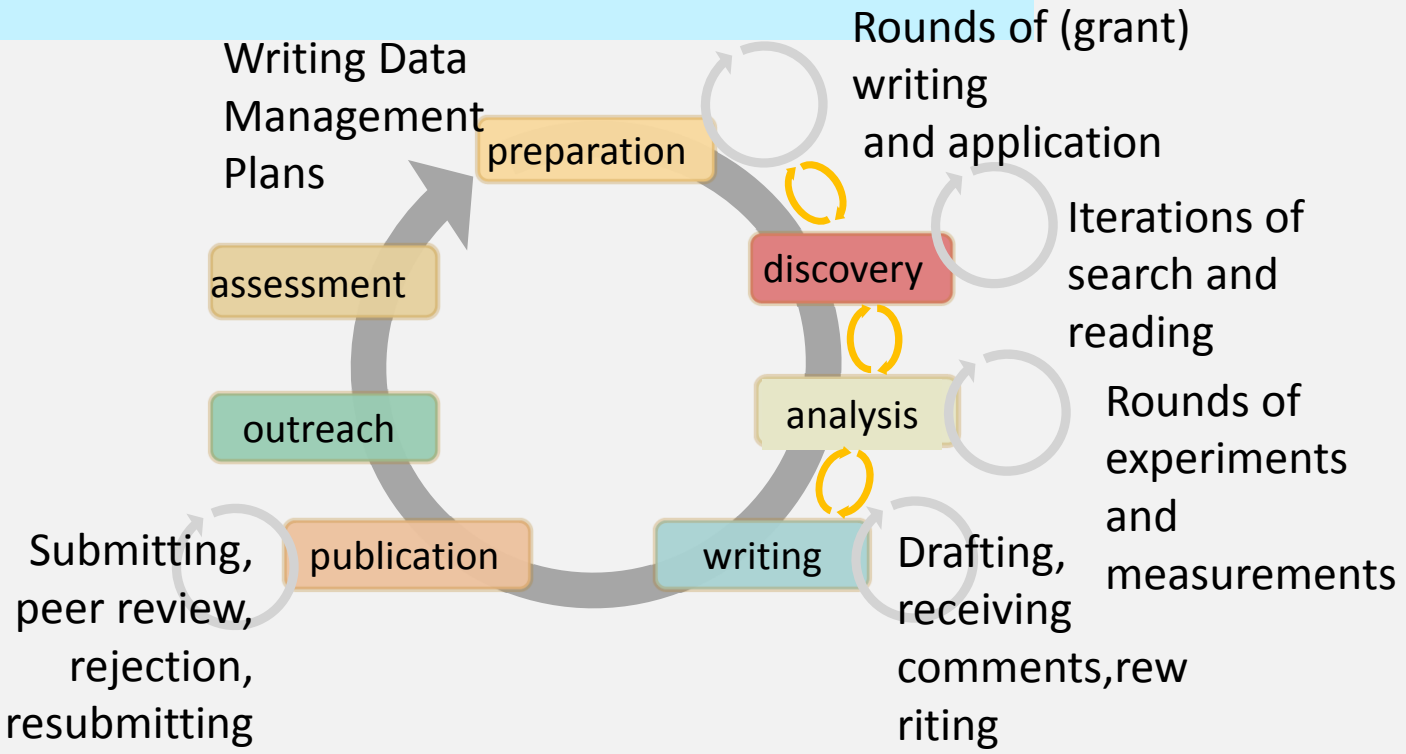
19th October 2018

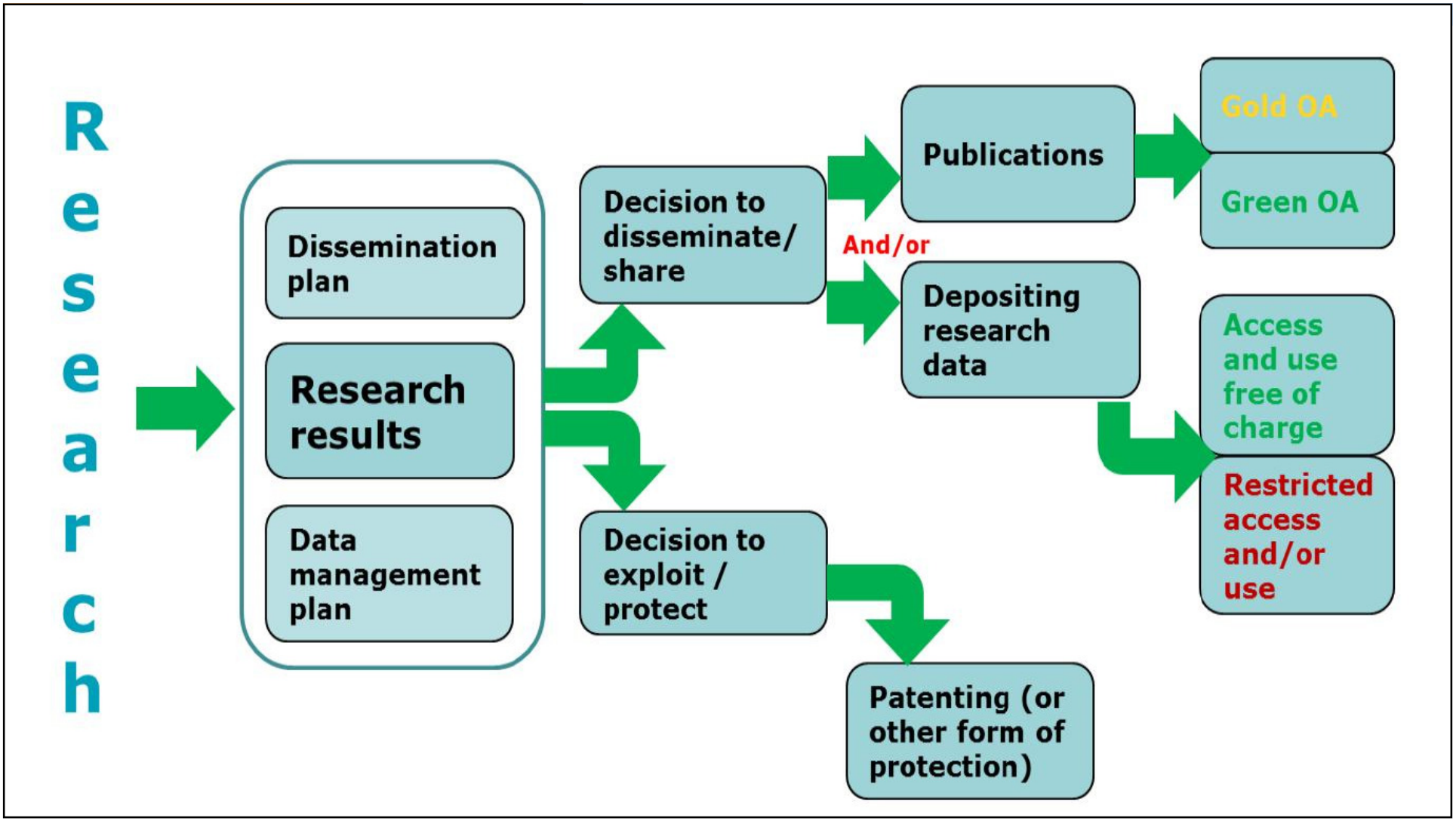
What makes a good Data Management Plan (DMP)? Common themes to address in DMPs and some sample texts

A model of the research workflow



A model of the research workflow




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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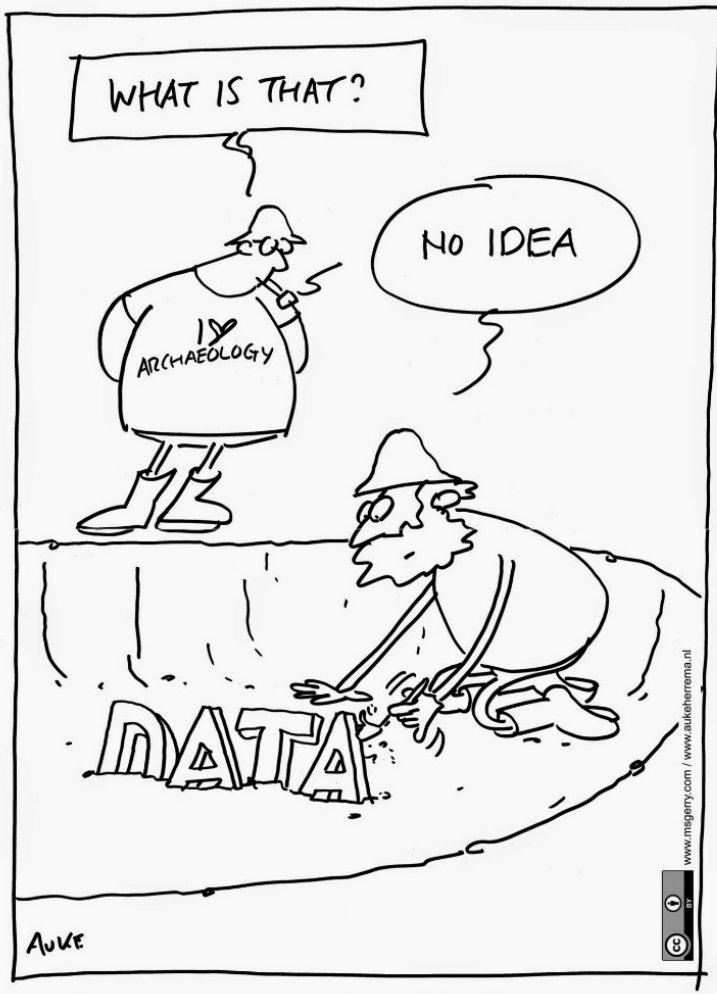
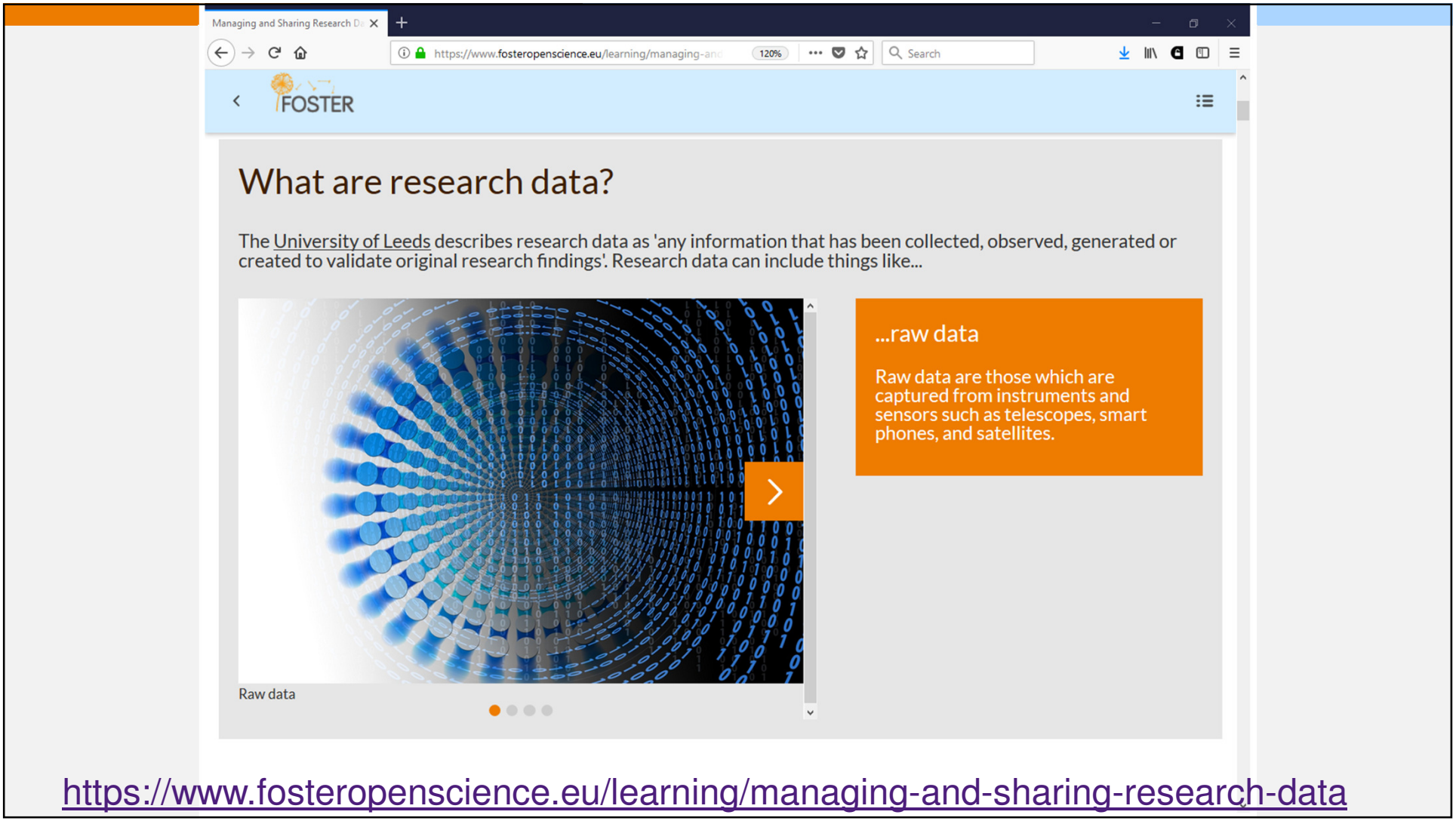
Defining your data

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

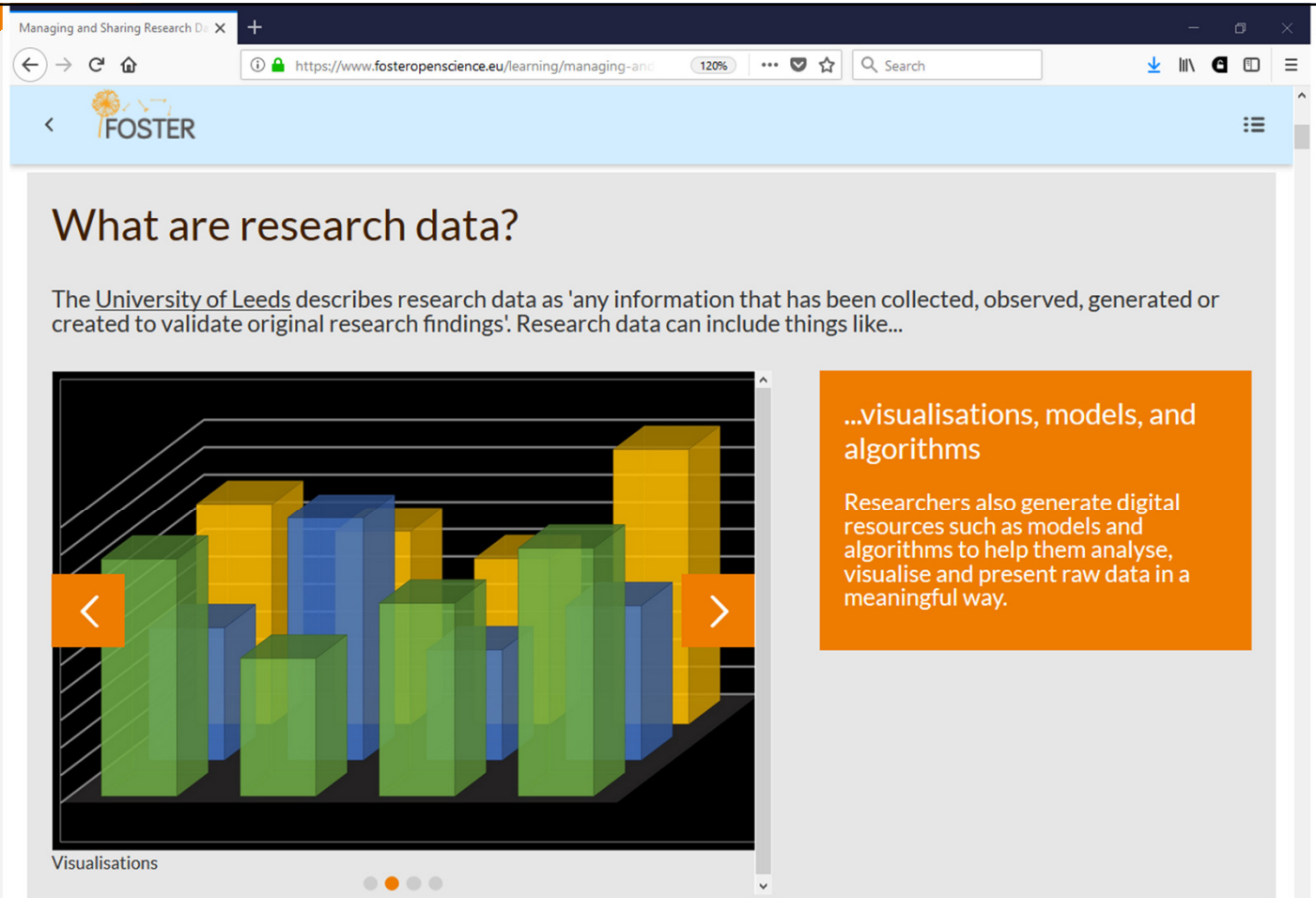


DATA FOR FUTURE GENERATIONS

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



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



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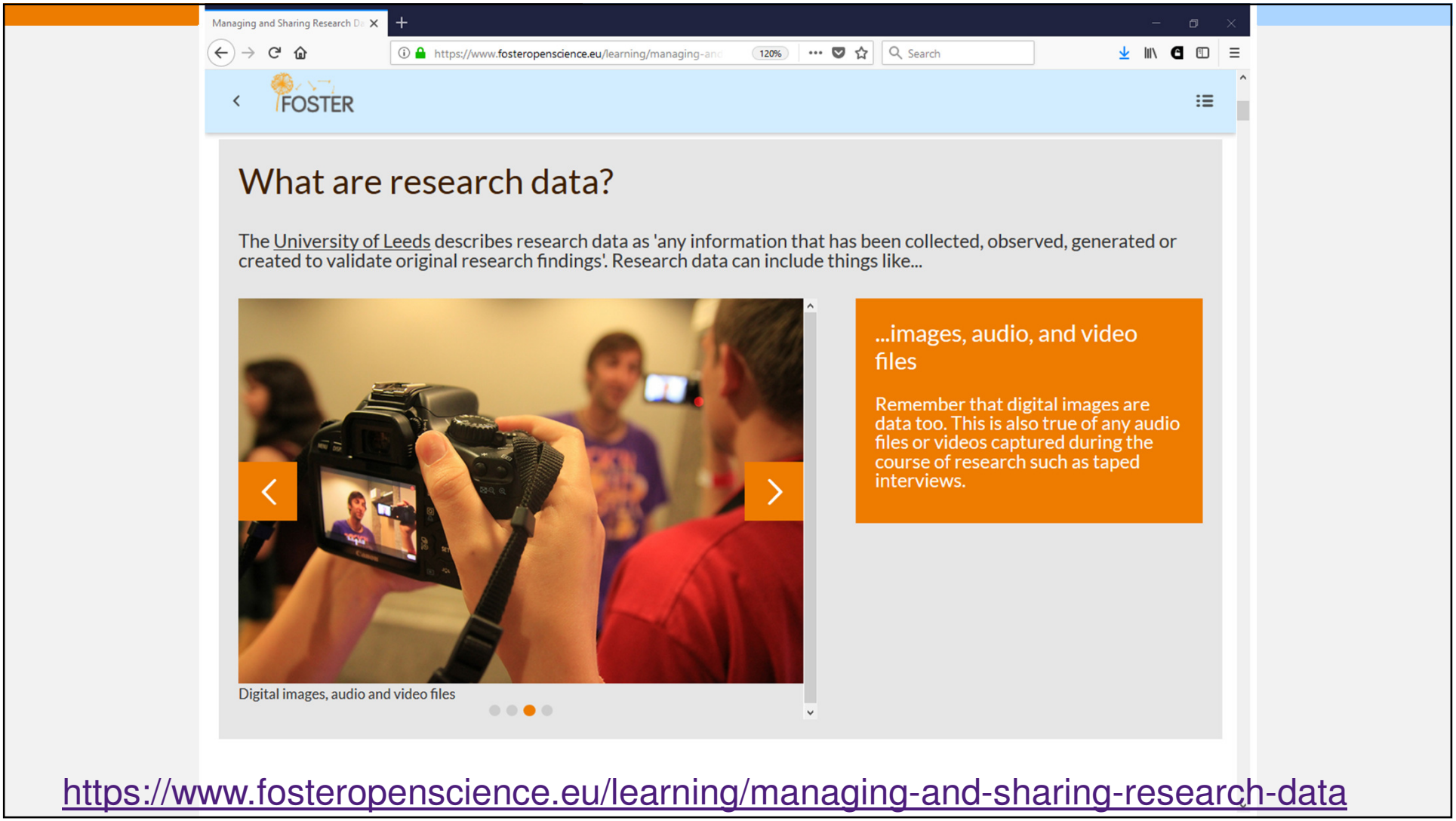

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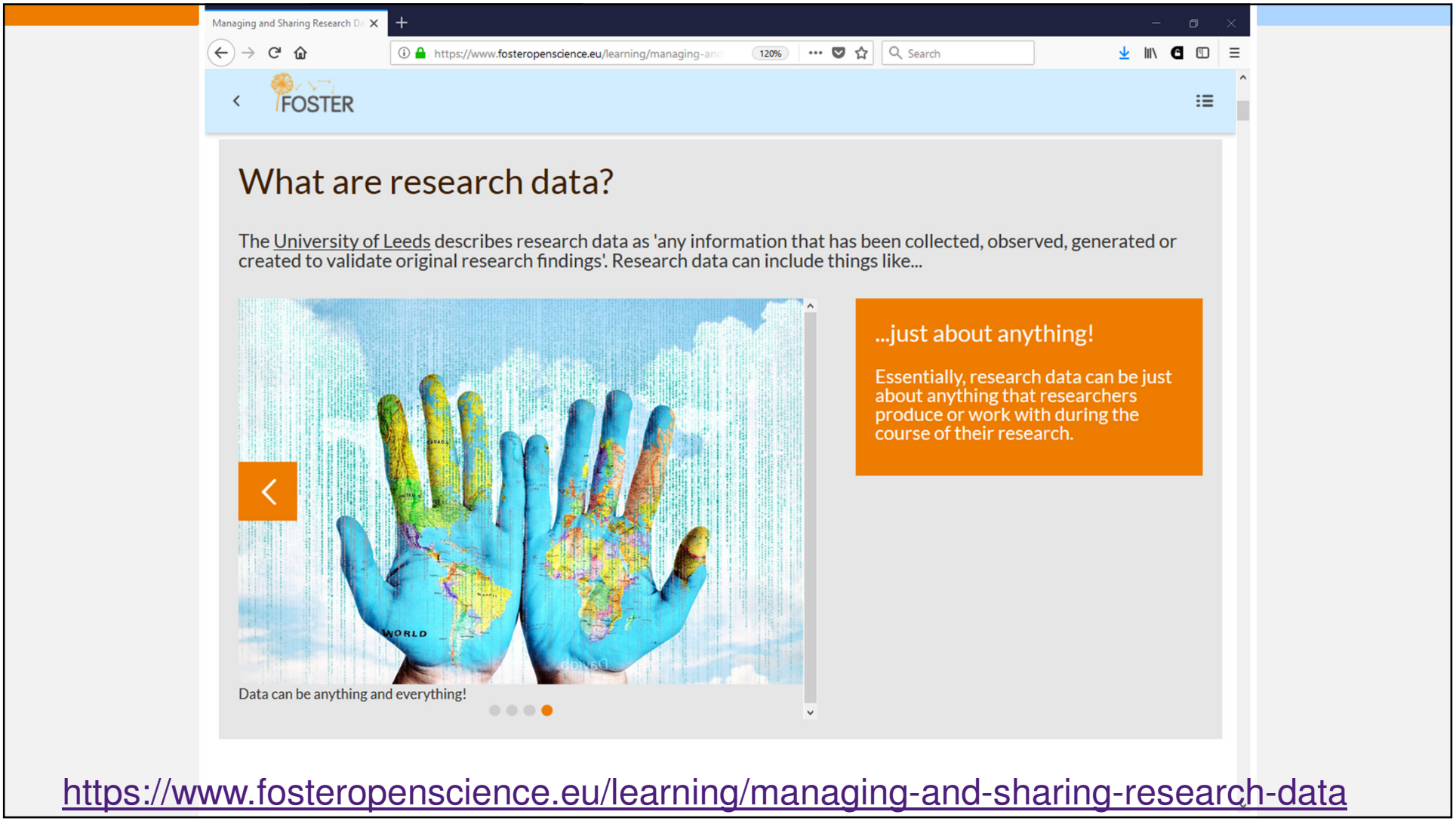

https://www.fosteropenscience.eu/learning/managing-and-sharing-research-data

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 – use 5 Star Open Data Model to 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

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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)

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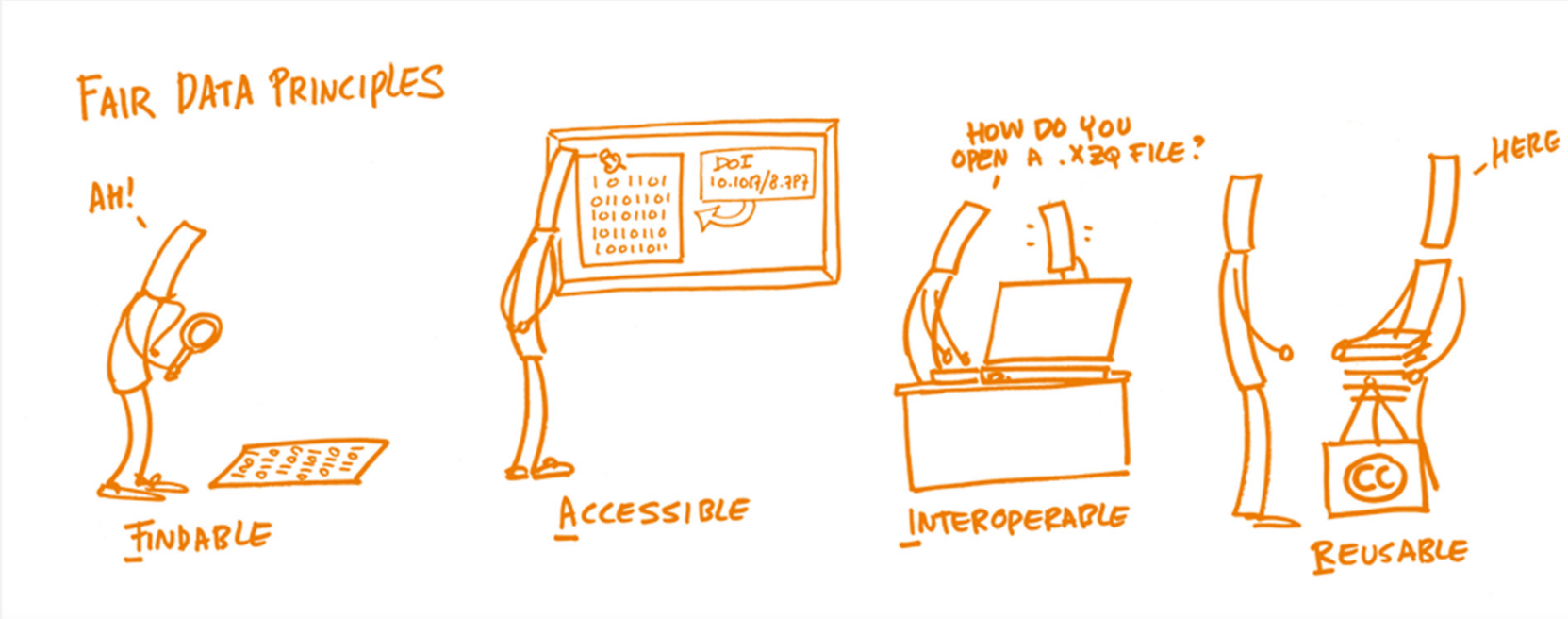
Sharing your data

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

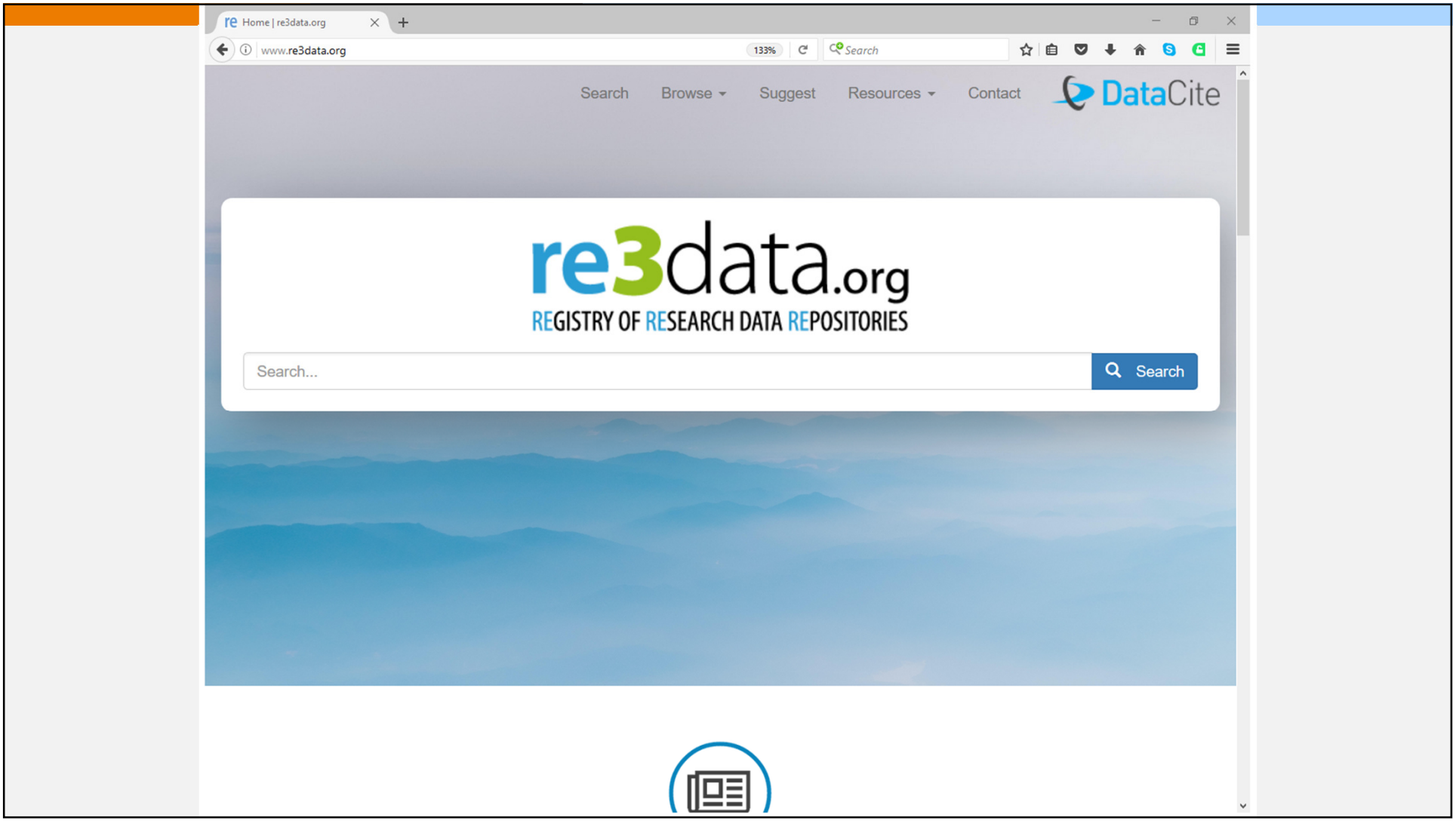
Misconception #1:

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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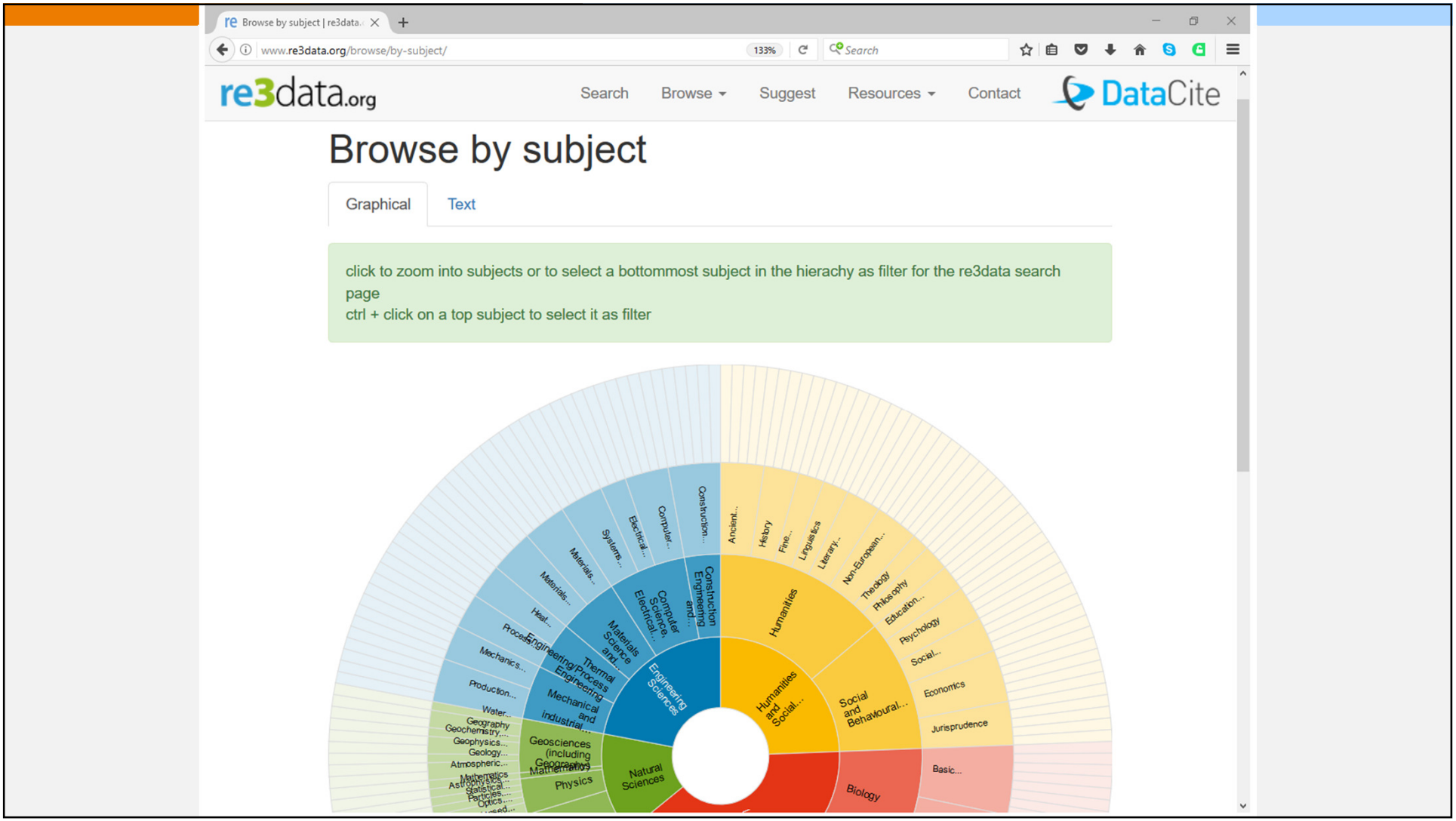
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Social and Behavioural...
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Physics
Mathematics
Geosciences (including Geography)
Mechanical and industrial...
Engineering/Process Engineering
Thermal
Materials Science and...
Computer Science, Electrical...
Construction Engineering and...
Ancient...
History
Fine...
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Non-European...
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Basic...
Construction...
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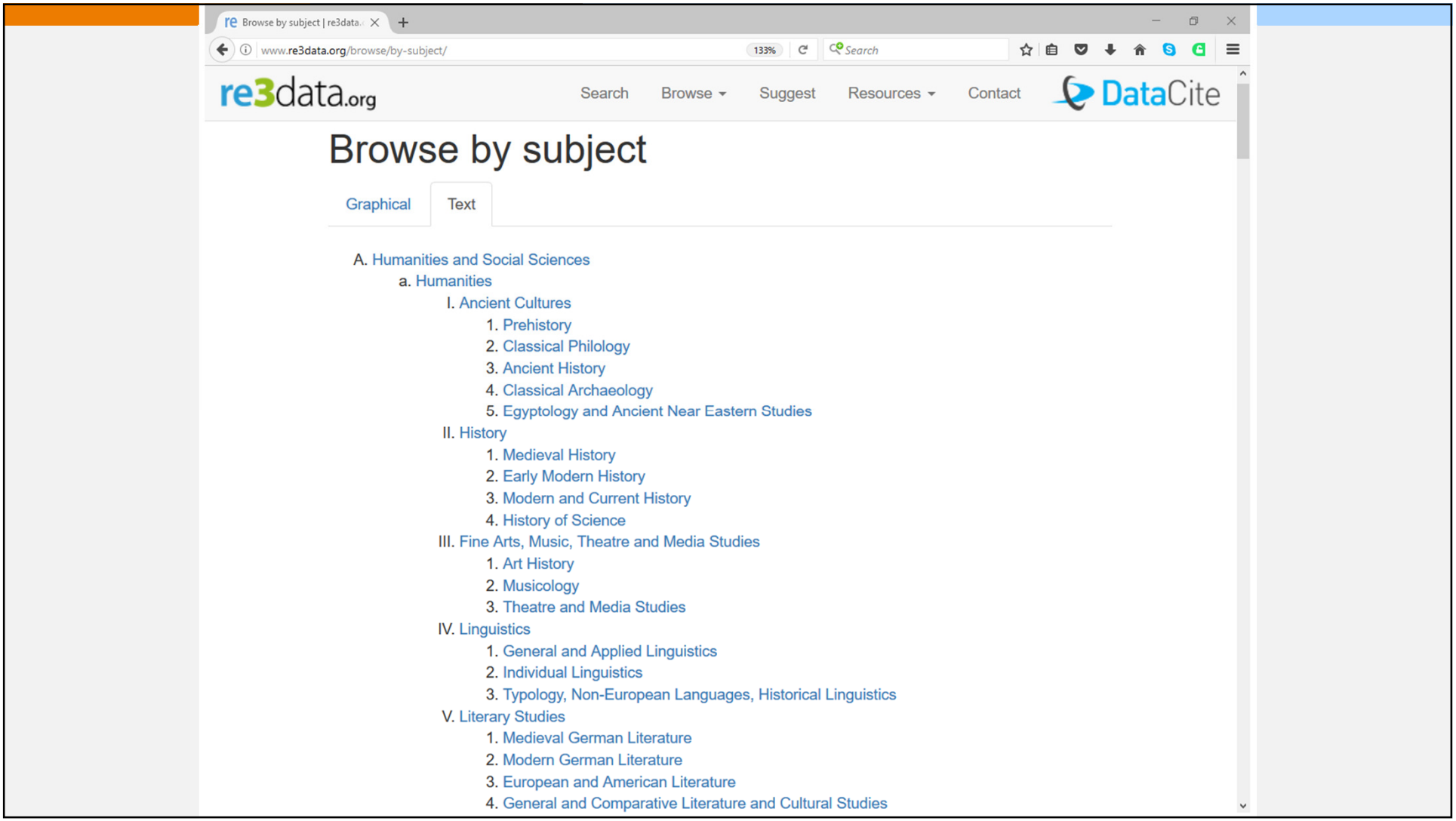
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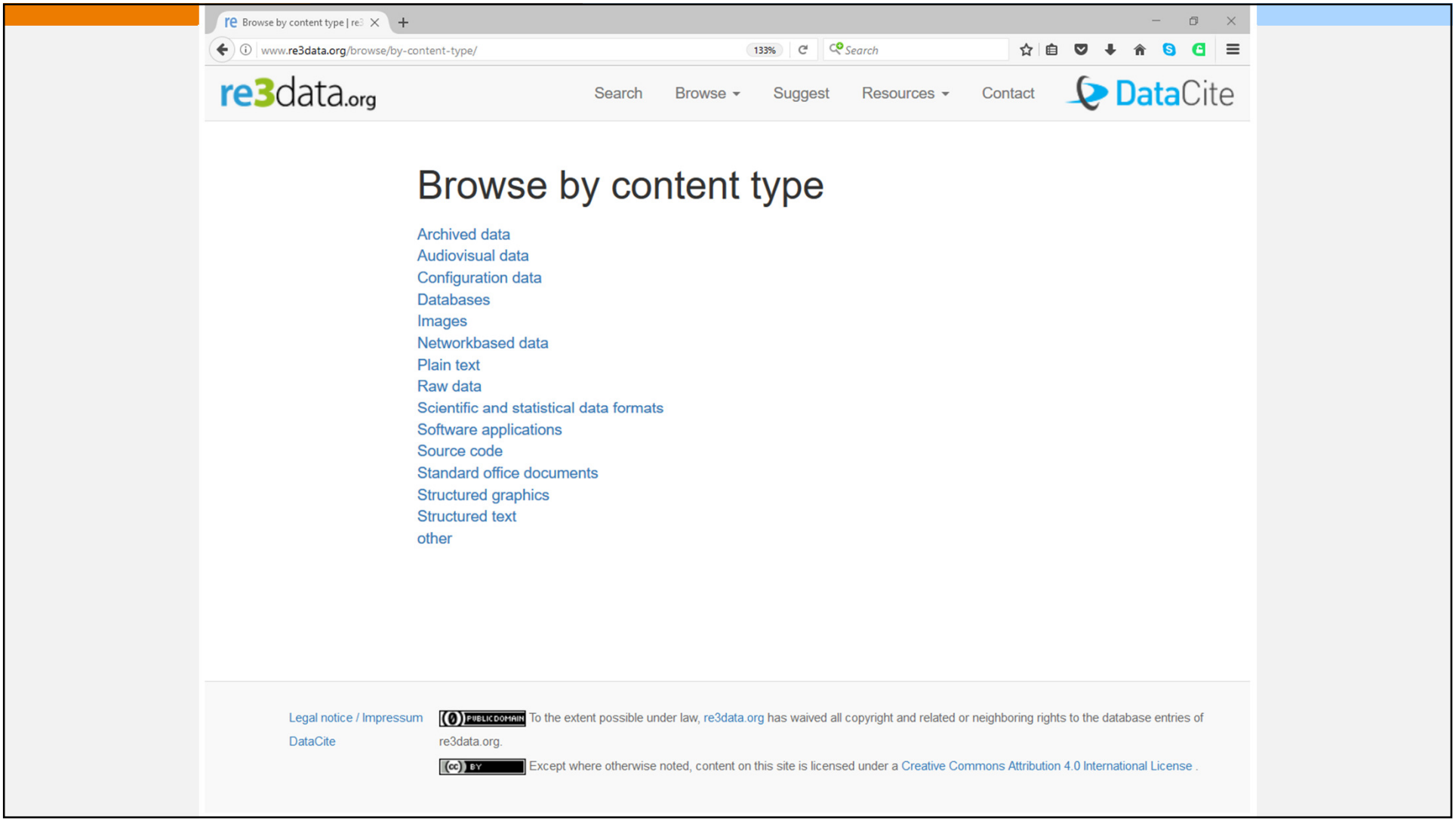
a. Humanities
I. Ancient Cultures
1. Prehistory
2. Classical Philology
3. Ancient History
4. Classical Archaeology
5. Egyptology and Ancient Near Eastern Studies
II. History
1. Medieval History
2. Early Modern History
3. Modern and Current History
4. History of Science
III. Fine Arts, Music, Theatre 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
1. Medieval German Literature
2. Modern German Literature
3. European and American Literature
4. General and Comparative Literature and Cultural Studies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Databases
Images
Networkbased data
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Source code
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Structured graphics
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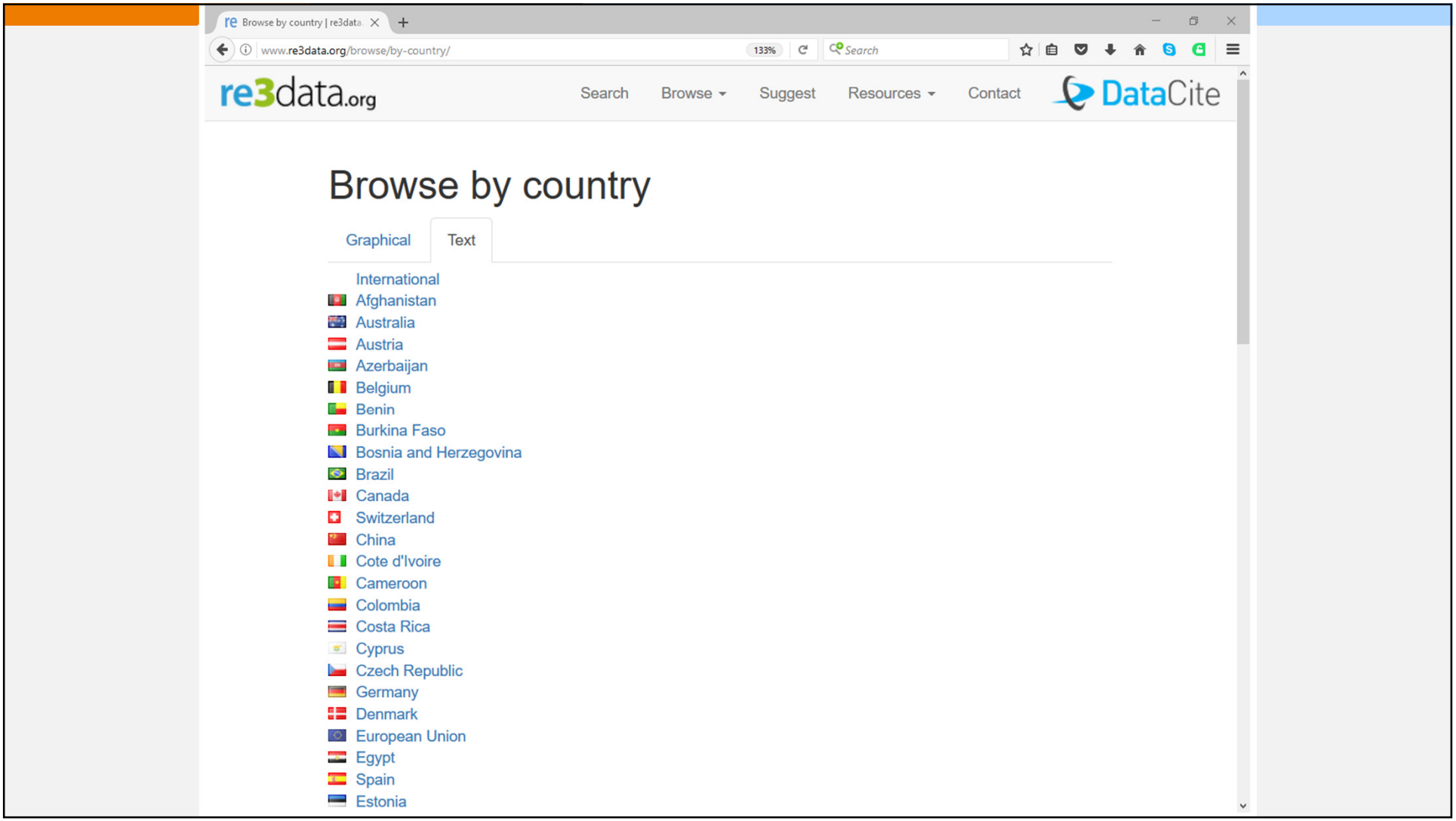
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Burkina Faso
Bosnia and Herzegovina
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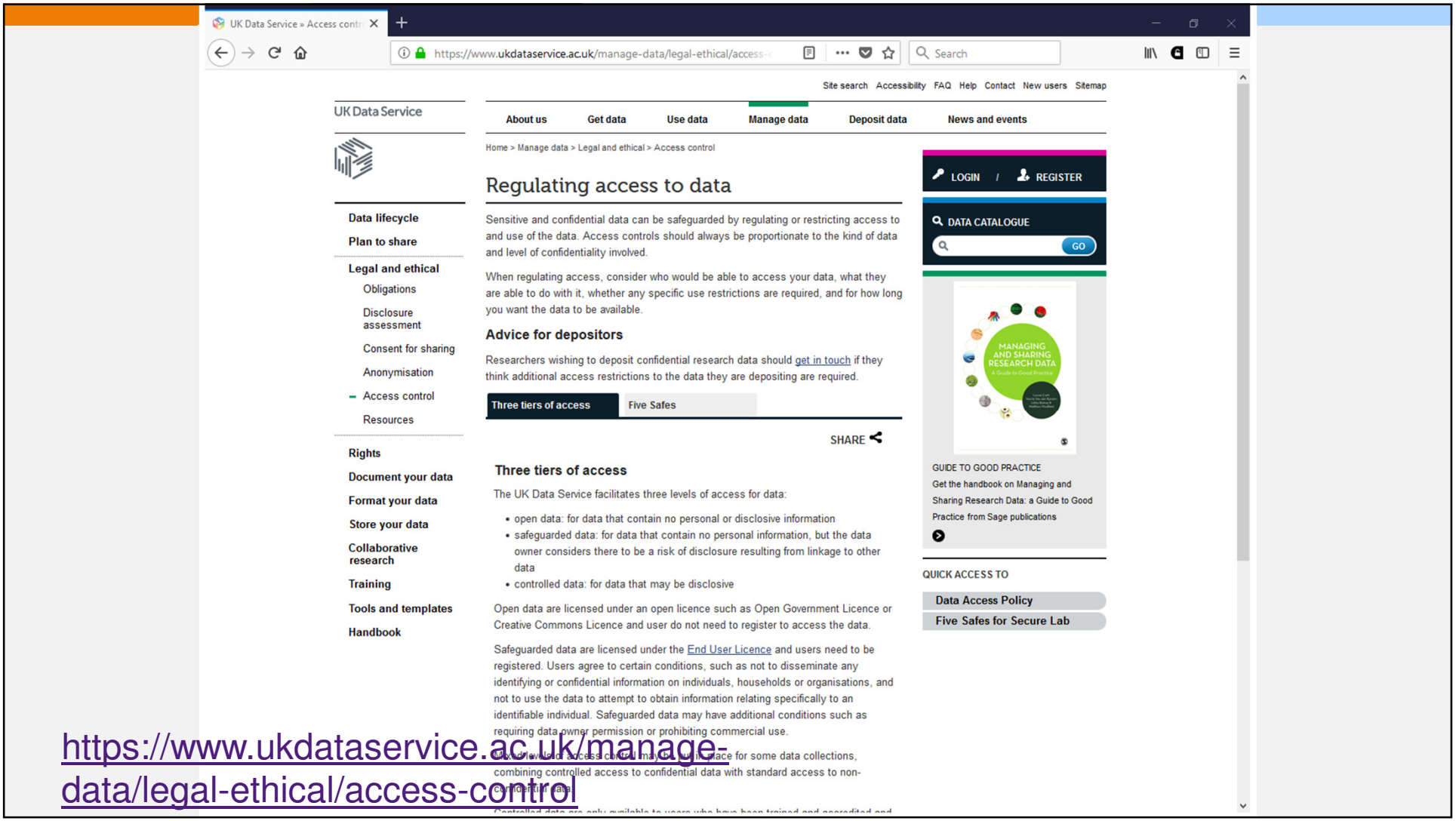
Cameroon
Colombia
Costa Rica
Cyprus
Czech Republic
Germany
Denmark
European Union
Egypt
Spain
Estonia

There are ways to share sensitive data too

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



https://www.ukdataservice.ac.uk/manage-data/legal-ethical/access-control

Three tiers of access

open data: for data that contain no personal or disclosive information (licensed under an open licence)

safeguarded data: for data that contain no personal information, but the data owner considers there to be a risk of disclosure resulting from linkage to other data (licensed under the End User Licence and users need to be registered)

controlled data: for data that may be disclosive (http://blog.ukdataservice.ac.uk/access-to-sensitive-data-for-research-the-5-safes/)

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

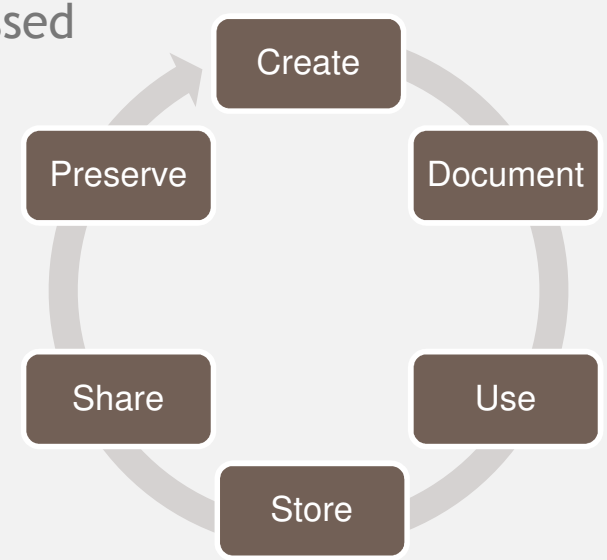
Misconception #2:

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!

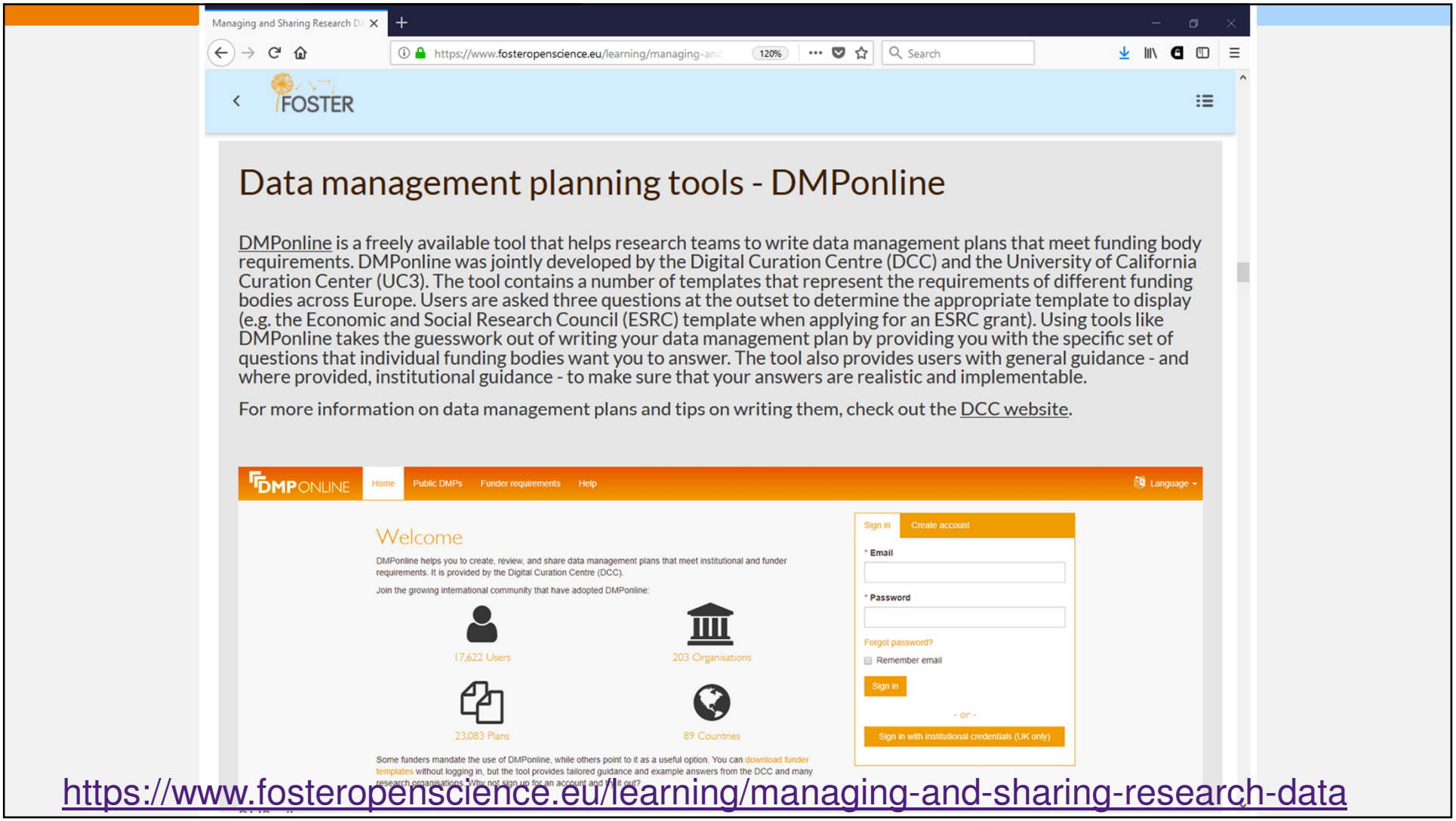
- What data will be created (format, types, volume...)
- Standards and methodologies to be used (incl. metadata)
- How ethics and Intellectual Property will be addressed
- Plans for data sharing and access
- Strategy for long-term preservation

A DMP is a plan to share!



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

https://dmponline.dcc.ac.uk



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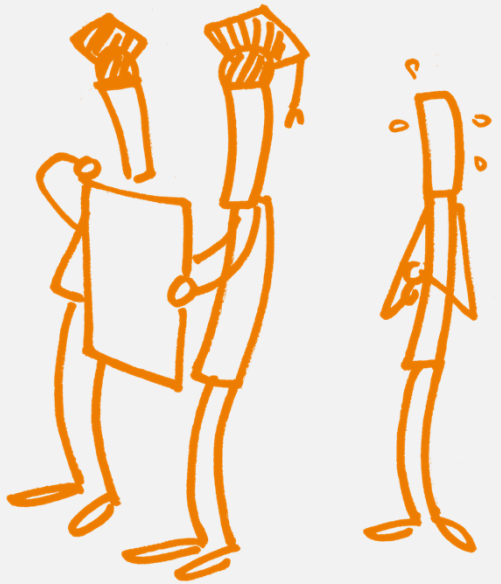
Misconception #3:

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



Pre-registration timestamps your work

Register Your Project

Open Science Framework

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)

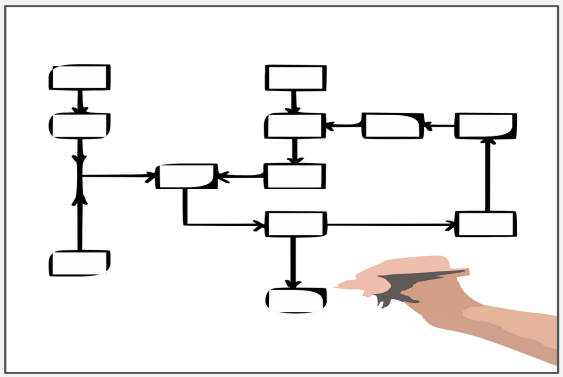
Open Data

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
- Publishers
- Institutions, funders

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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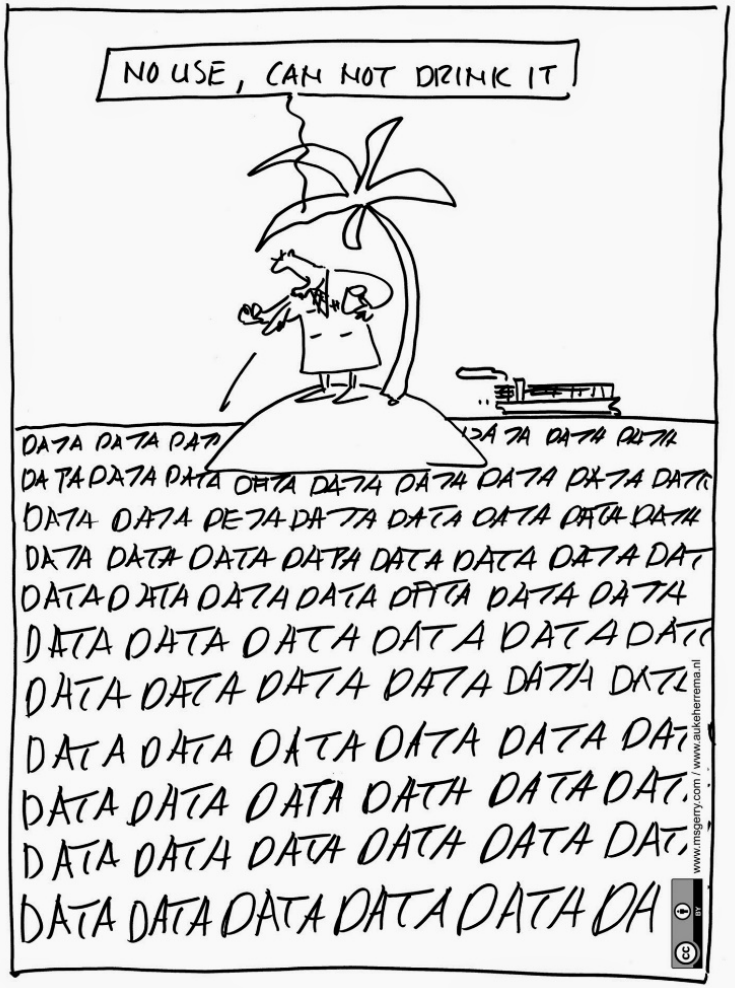
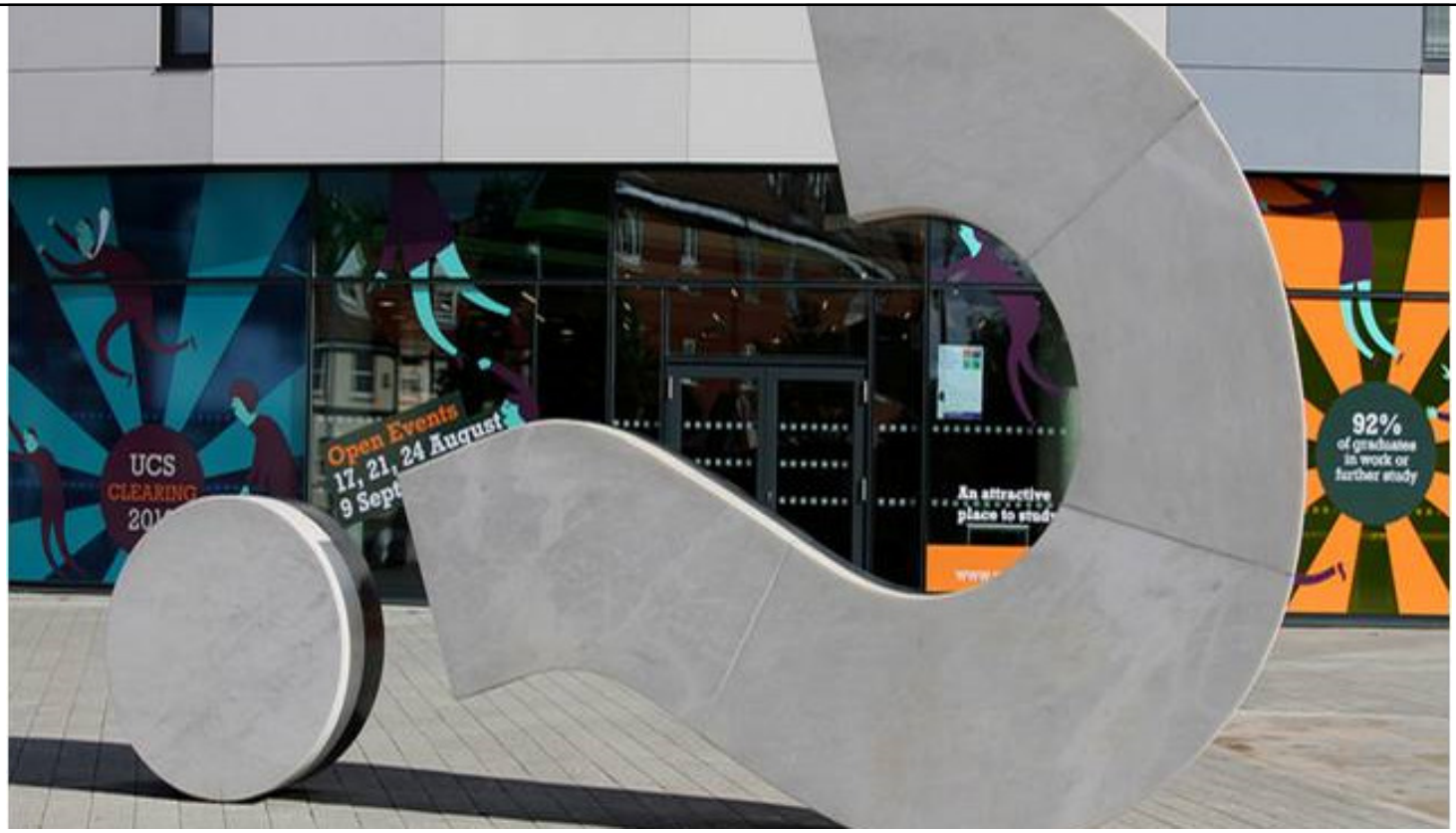


Image courtesy of http://aukeherrema.nl CC-BY



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.

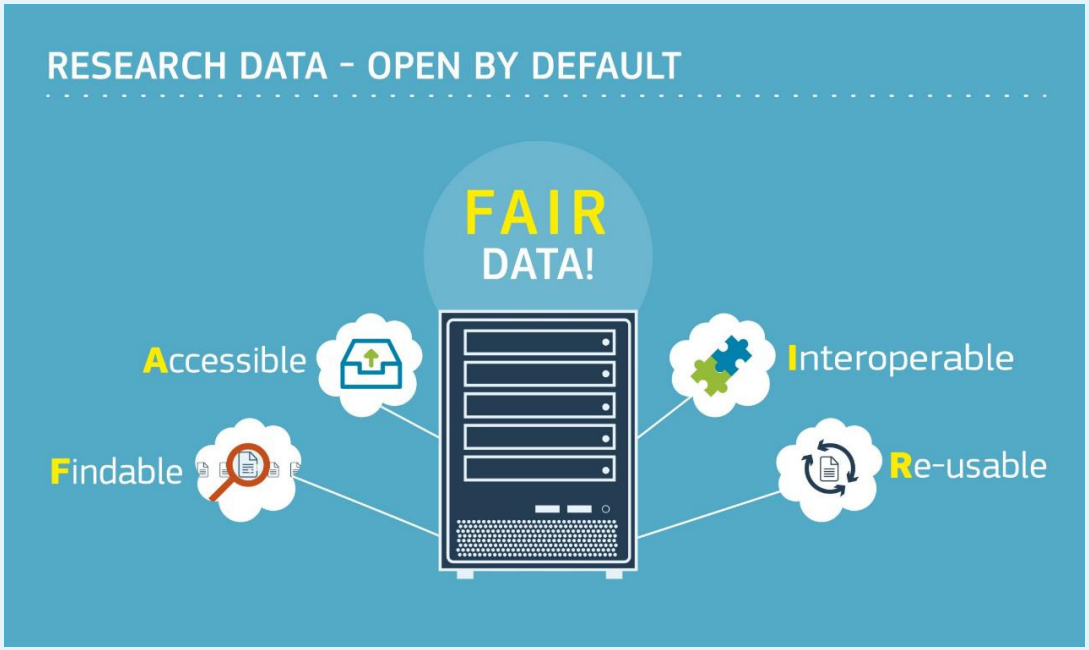
European Commission

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

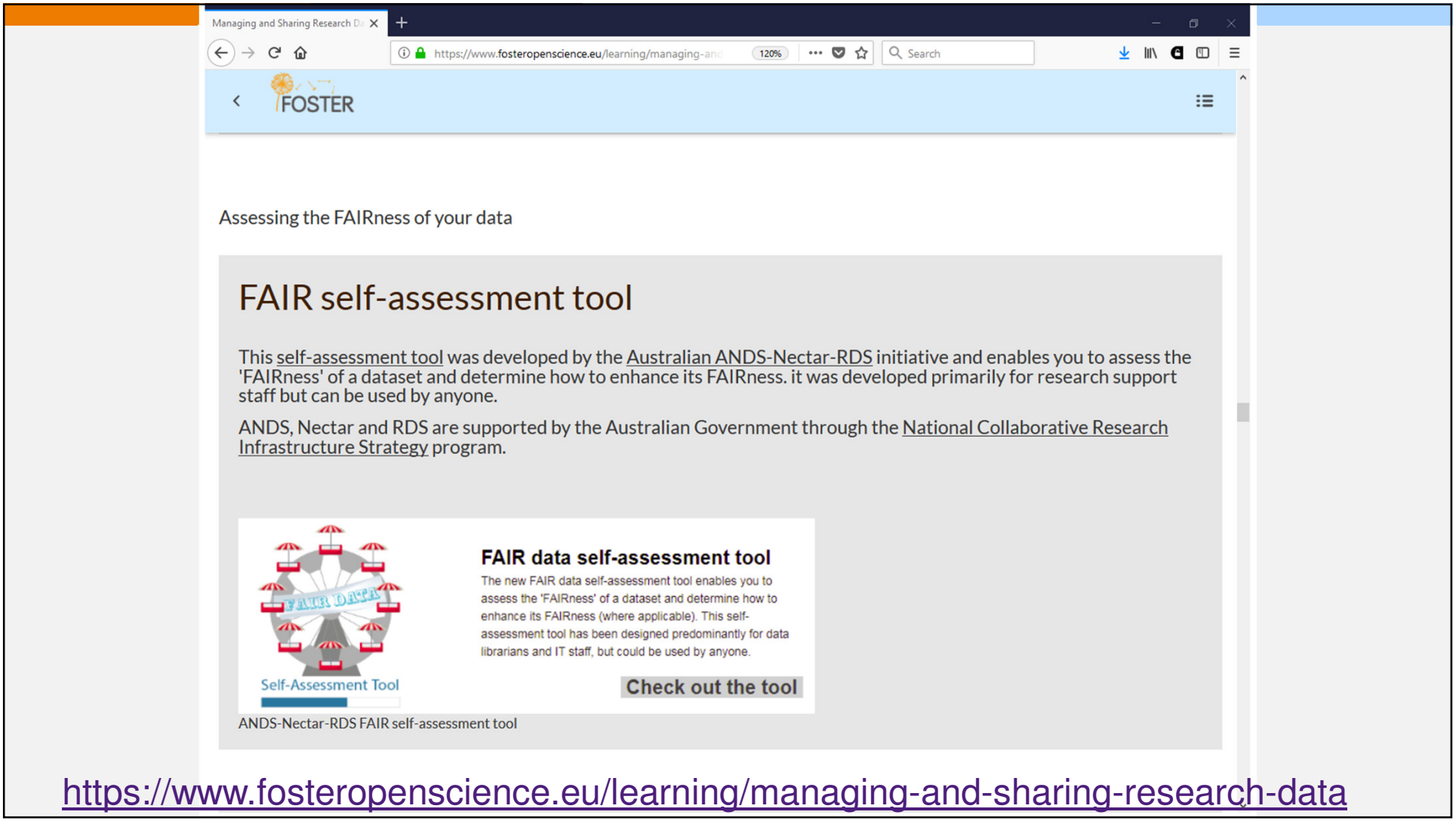
Findable – Assign persistent IDs, provide rich metadata, register in a searchable resource,...

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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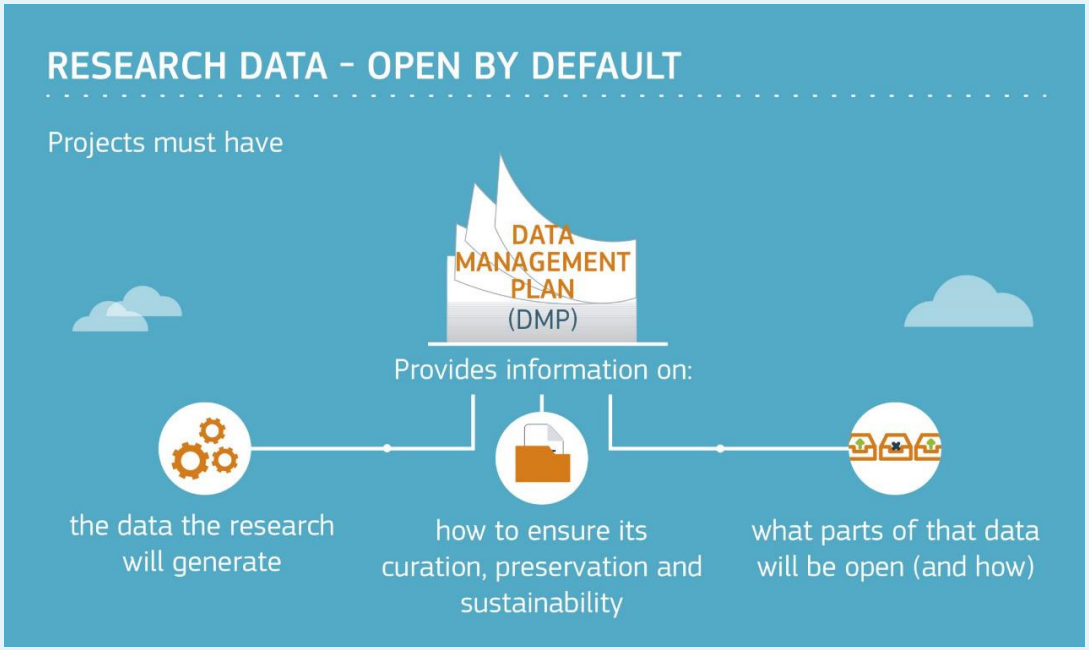
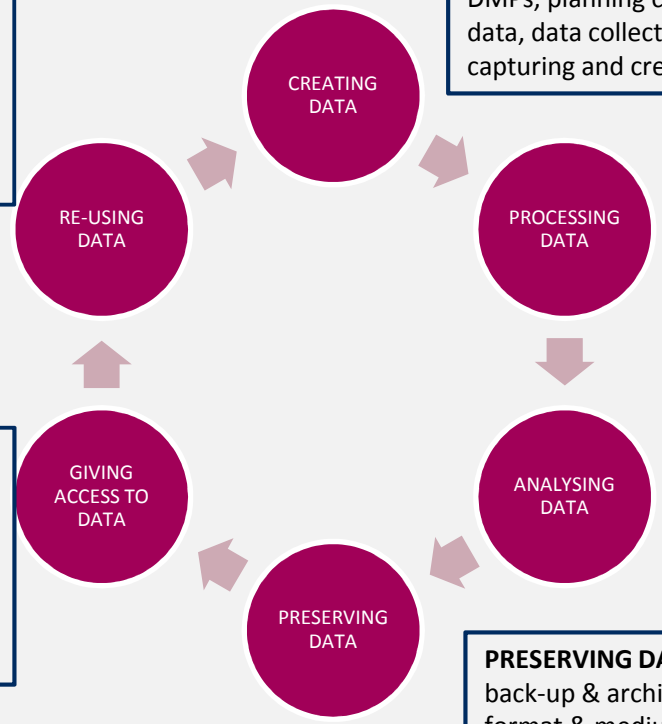

RESEARCH DATA - OPEN BY DEFAULT
Projects must have
DATA MANAGEMENT PLAN (DMP)
Provides information on:
the data the research will generate
how to ensure its curation, preservation and sustainability
what parts of that data will be open (and how)

Research data lifecycle



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

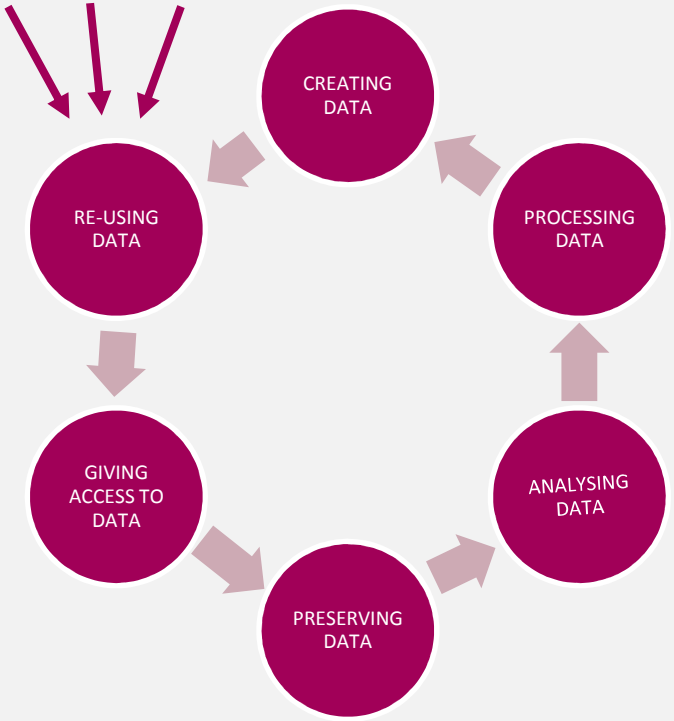
ACCESS TO DATA: distributing data, sharing data, controlling access, establishing copyright, promoting data

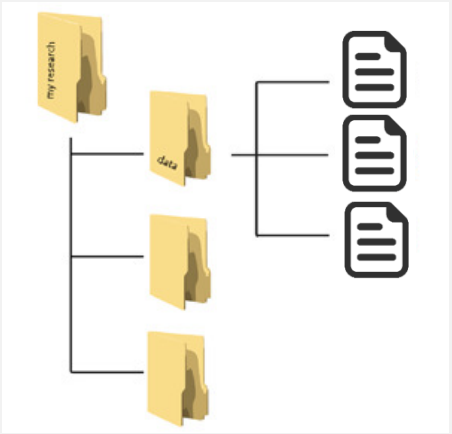
RE-USING DATA: follow-up research, new research, undertake research reviews, scrutinising findings, teaching & learning

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?





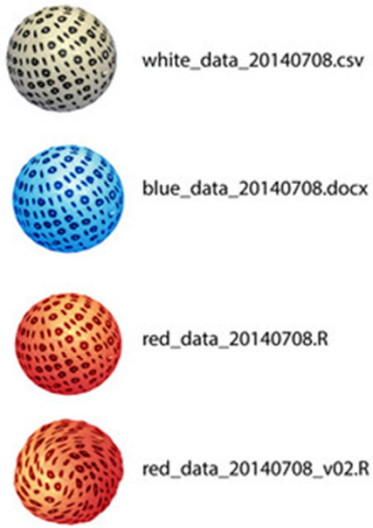
Data organisation

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.

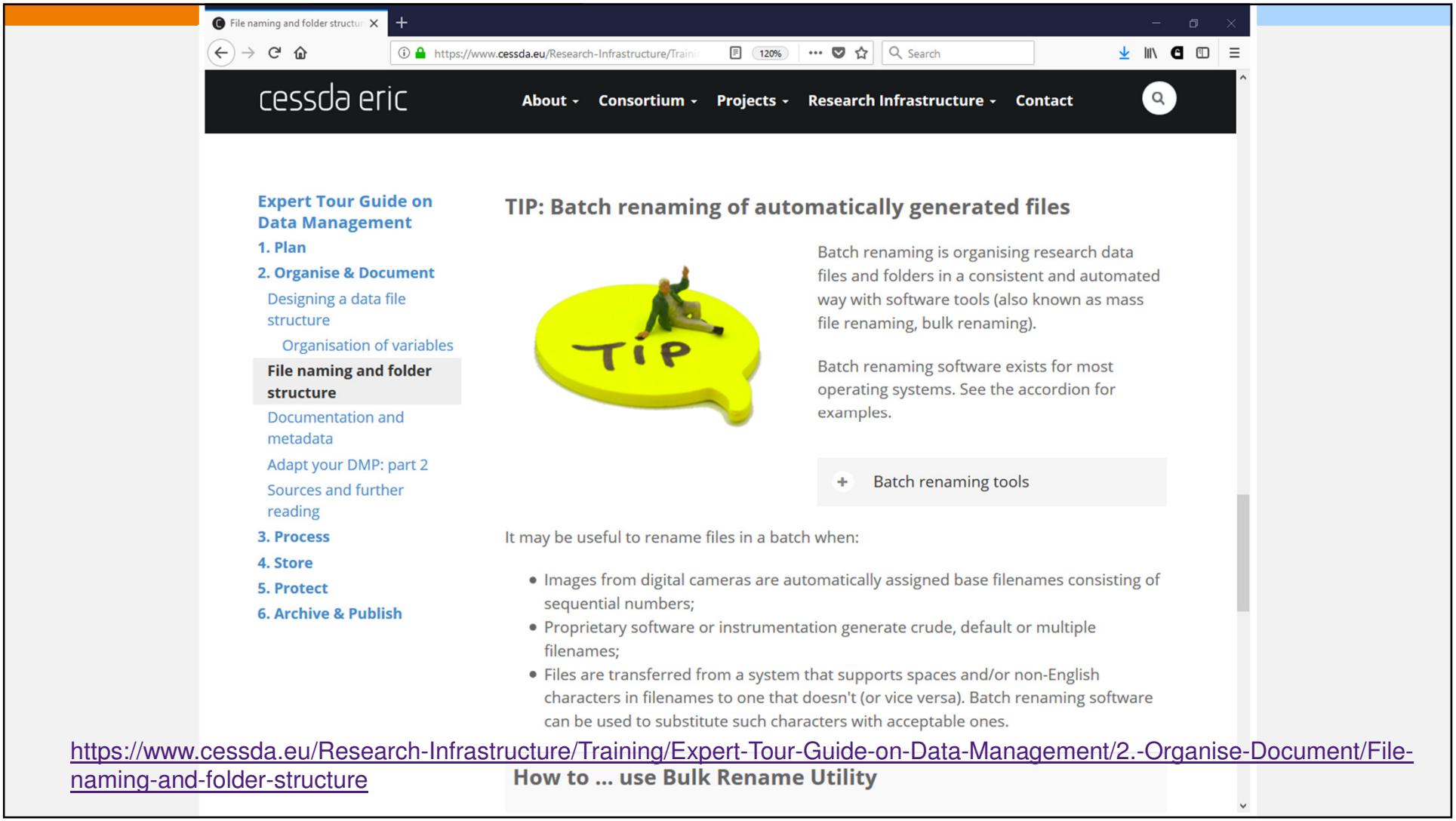
It is good practice to note the file naming and its meaning in a readme.txt.



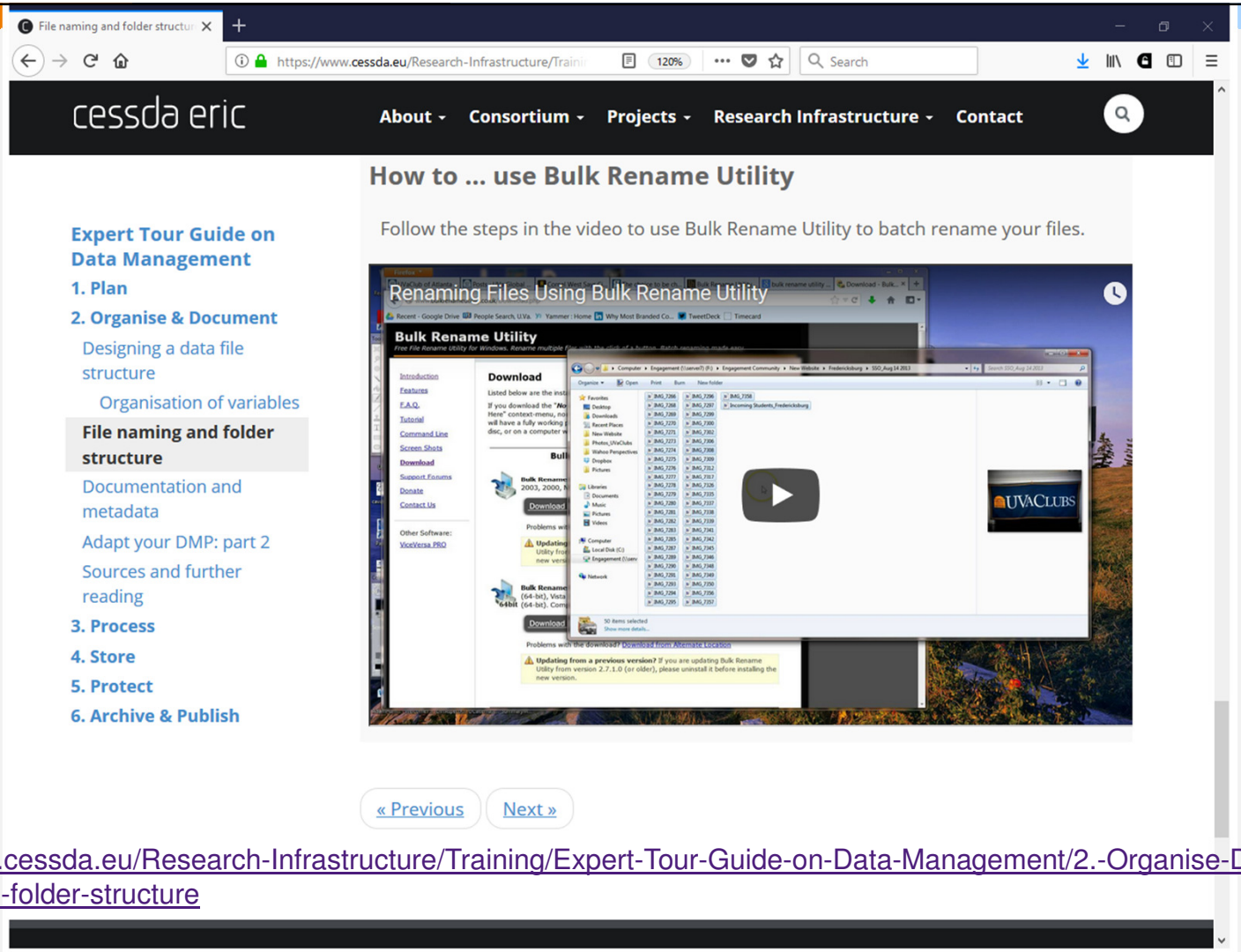
File naming and version management

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

How to avoid a data management nightmare

A few tips for avoiding a data management nightmare. A video created by NYU Health Sciences Library's Karen Hanson, Kevin Read, and Alisa Surkis

https://www.youtube.com/watch?v=nNBiCcBlwRA

Why manage data?

NON PECUNIAE INVESTIGATIONIS CURATORE

SED VITAE FACIMUS PROGRAMMAS DATORUM

PROCURATIONIS

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

- 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

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

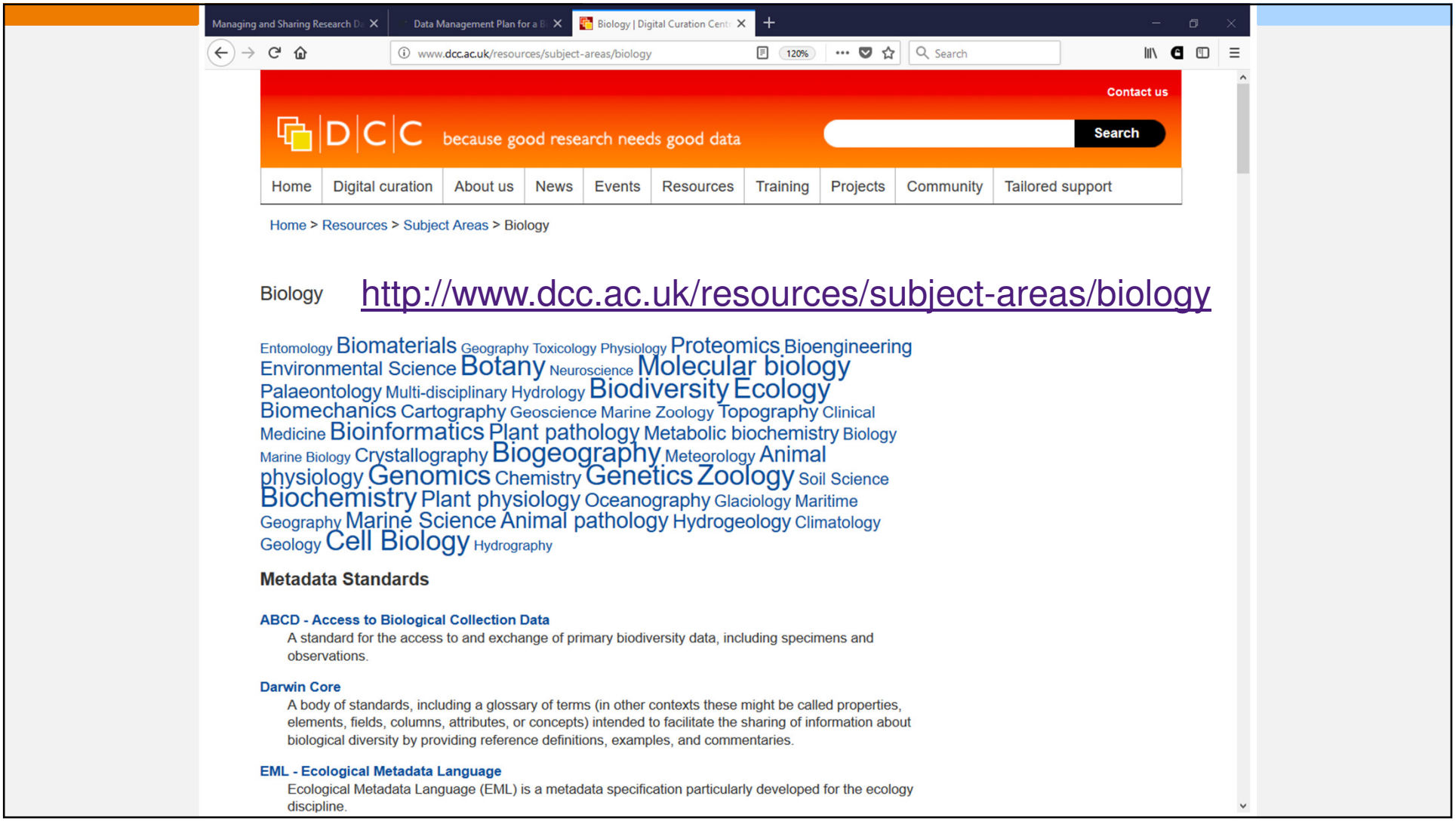
The final dataset will include self-reported demographic and behavioural data from interviews with the subjects and laboratory data from urine specimens provided.

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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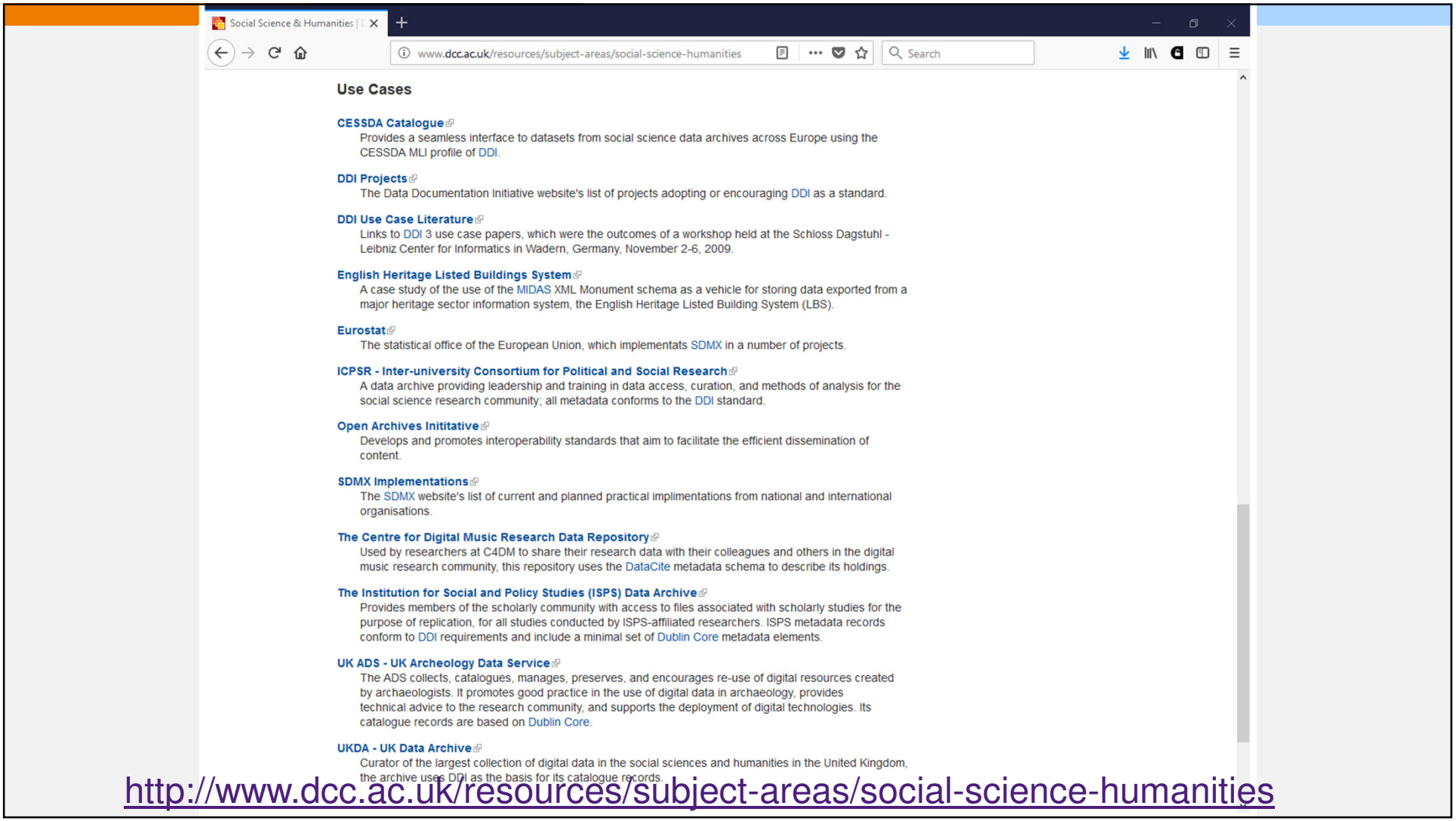
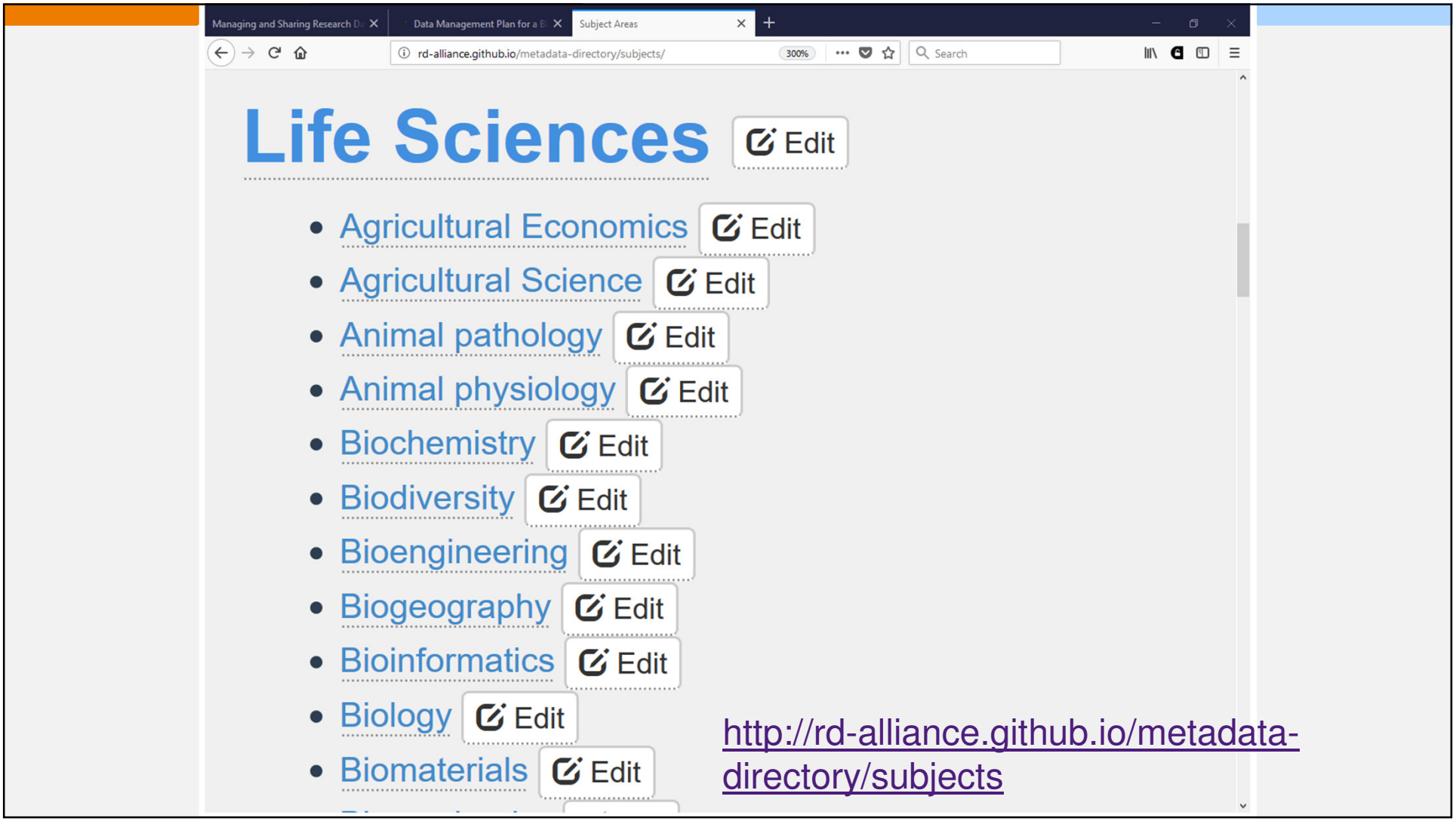
Metadata Standards
ABCD - Access to Biological Collection Data
A standard for the access to and exchange of primary biodiversity data, including specimens and observations.
Darwin Core
A body of standards, including a glossary of terms (in other contexts these might be called properties, elements, fields, columns, attributes, or concepts) intended to facilitate the sharing of information about biological diversity by providing reference definitions, examples, and commentaries.
EML - Ecological Metadata Language
Ecological Metadata Language (EML) is a metadata specification particularly developed for the ecology discipline.



http://www.dcc.ac.uk/resources/subject-areas/social-science-humanities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Agricultural Science
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Animal physiology
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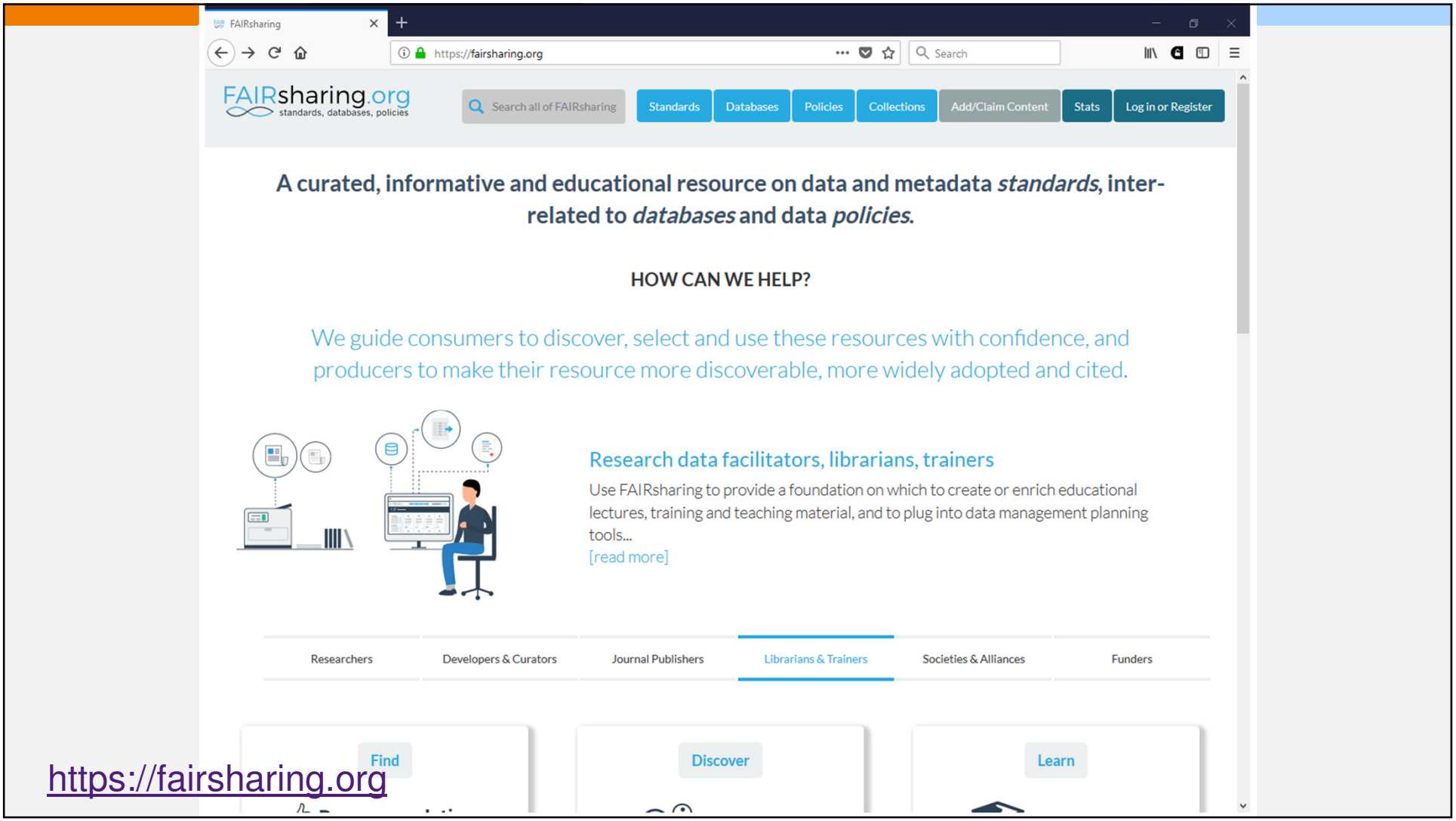


https://fairsharing.org

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

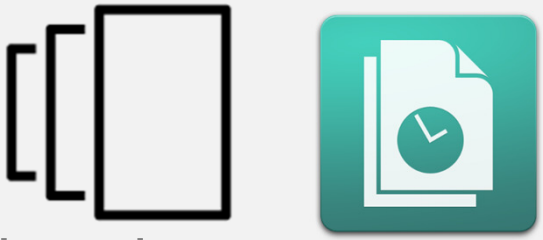
(Open) data sharing

Data Repository

Data are stable,
searchable, citable,
clearly licensed

Storing data: what is meant?

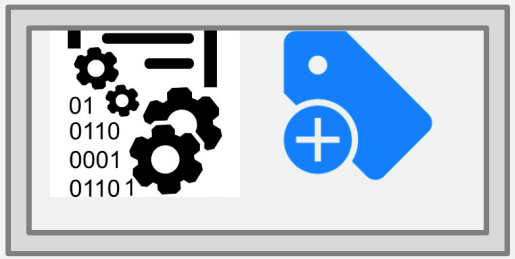
Storing and backing up files while research is active



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.

(All) Research. Shared.

— your one stop research shop!

All research outputs from across all fields of science are welcome! Zenodo accept any file format as well as both positive and negative results. However, we do promote peer-reviewed openly accessible research, and we do curate your upload before putting it on the front-page.

Citeable. Discoverable.

— be found!

Zenodo assigns all publicly available uploads a Digital Object Identifier (DOI) to make the upload easily and uniquely citeable. Zenodo further supports harvesting of all content via the OAI-PMH protocol.

Community Collections

— create your own repository

Zenodo allows you to create your own collection and accept or reject all uploads to it. Creating a space for your next workshop or project have never been easier. Plus, everything is citeable and discoverable.

www.zenodo.org

Safe

— more than just a drop box!

Your research output is stored safely for the future in same cloud infrastructure as research data from CERN's Large Hadron Collider using a CERN's battle-tested repository software INVENIO used by some of the world's largest repositories such as INSPIRE HEP and CERN Document Server.

Reporting

— tell your funding agency!

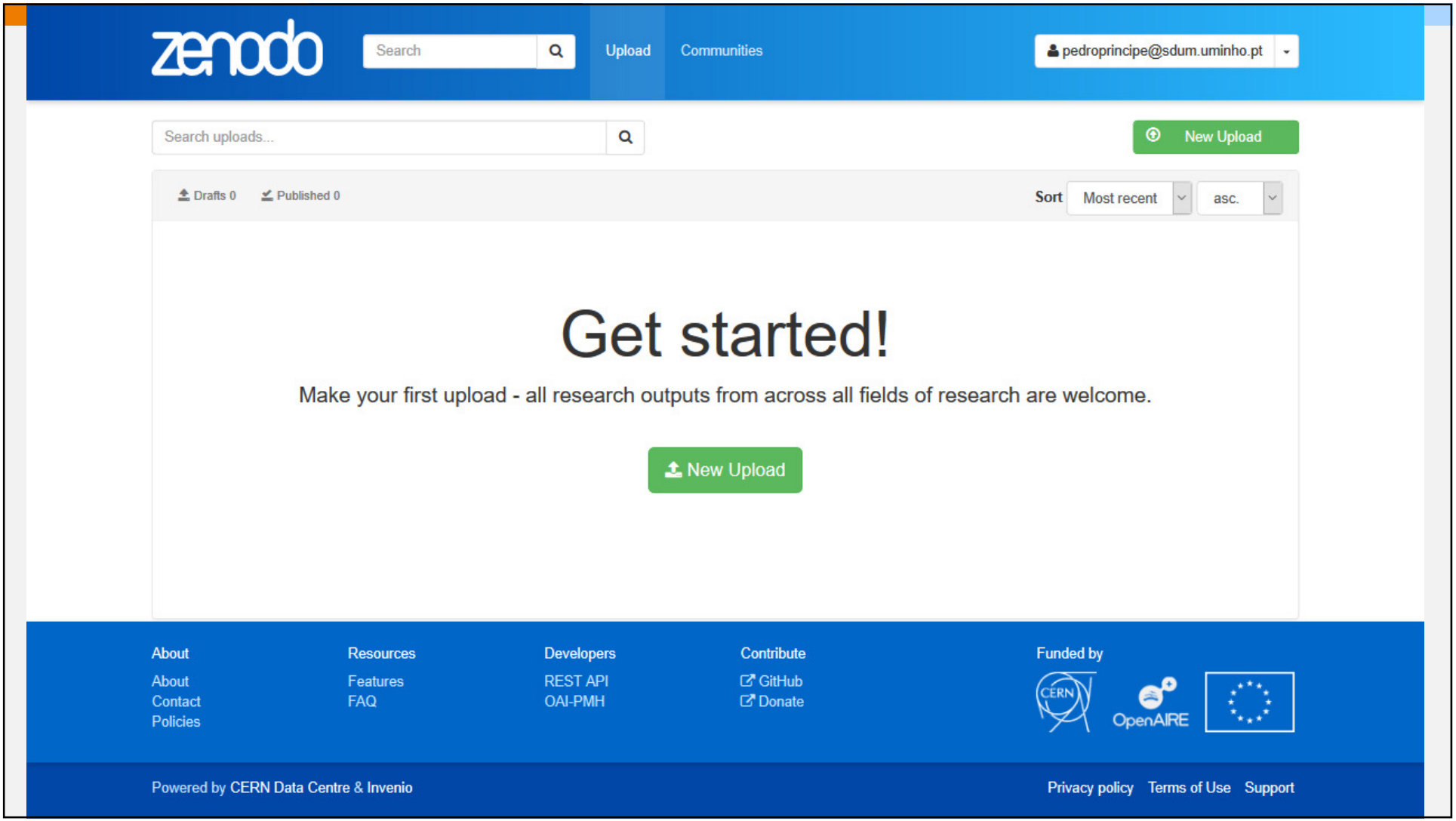
Zenodo is integrated into reporting lines for research funded by the European Commission via OpenAIRE. Just upload your research on Zenodo and we will take care of the reporting for you. We plan to extend with futher funding agencies in the future so stay tuned!

Flexible Licensing

— not everything is under Creative Commons

Zenodo encourage you to share your research as openly as possible to maximize use and re-use of your research results. However, we also acknowledge that one size does not fit all, and therefore allow for uploading under a multitude of different licenses and access levels*.

* You are responsible for respecting applicable copyright and license conditions for the files you upload.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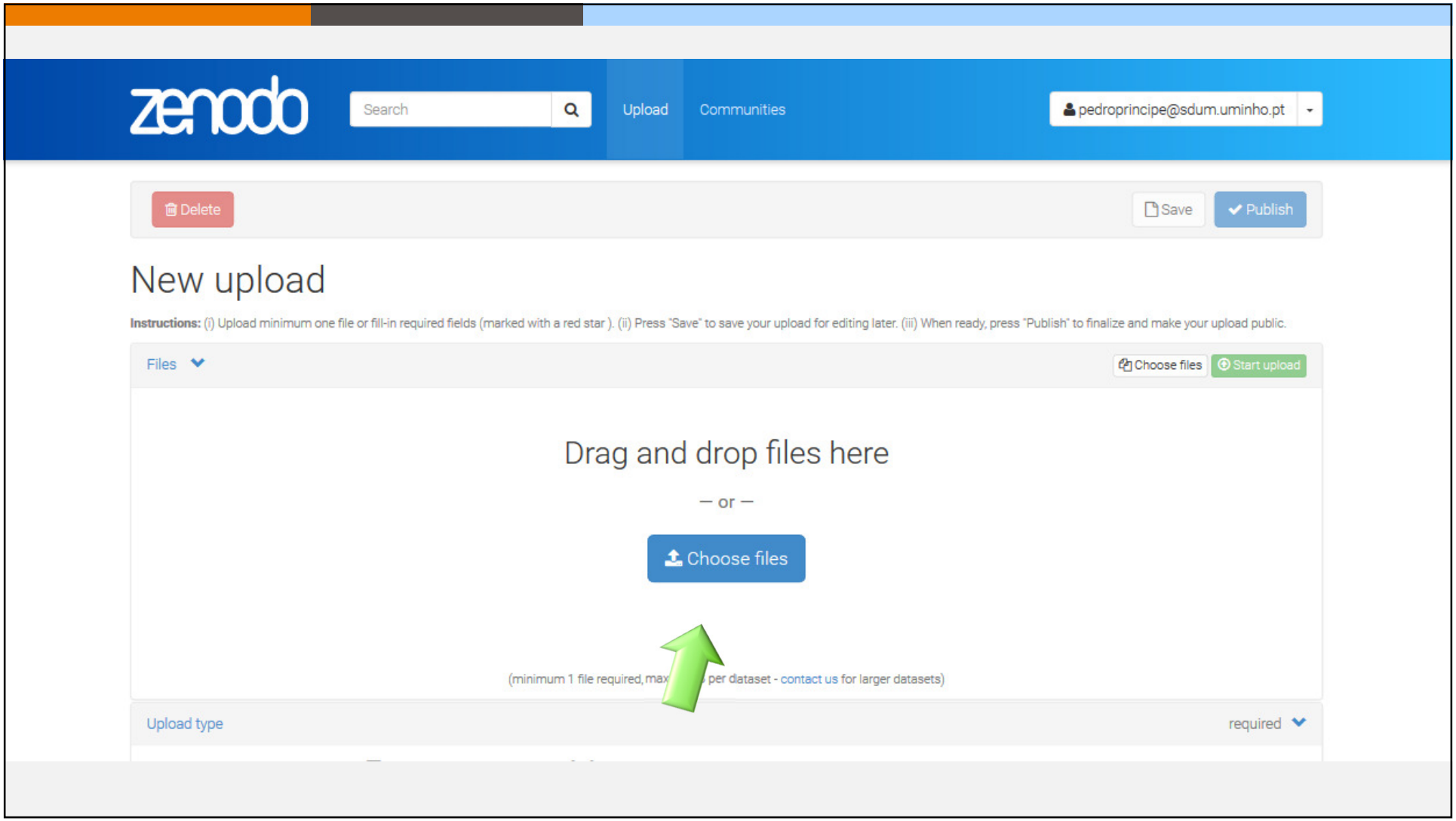
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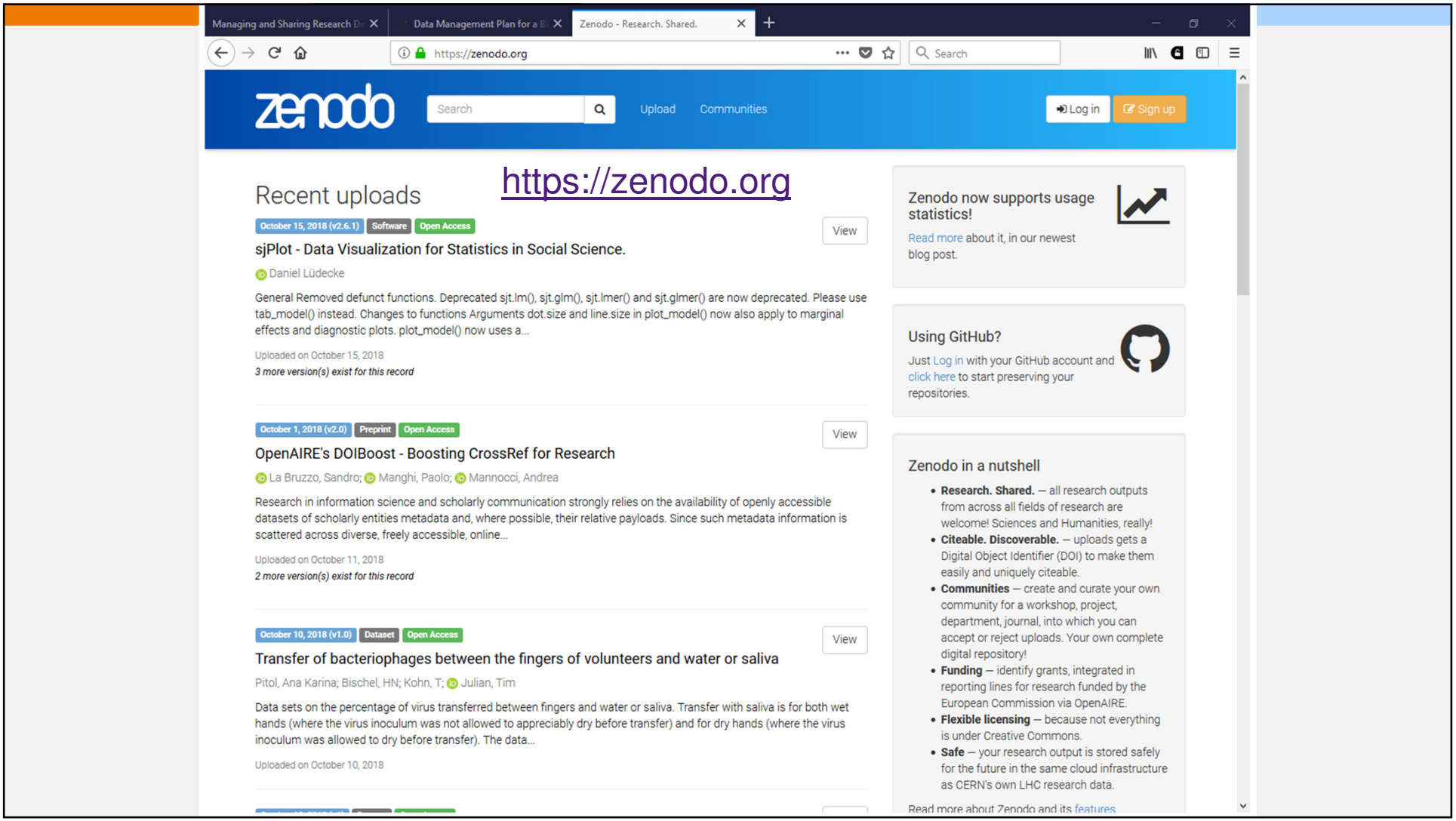
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Daniel Lüdecke
General Removed defunct functions. Deprecated sjt.lm(), sjt.glm(), sjt.lmer() and sjt.glmer() are now deprecated. Please use tab_model() instead. Changes to functions Arguments dot.size and line.size in plot_model() now also apply to marginal effects and diagnostic plots. plot_model() now uses a...
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La Bruzzo, Sandro; Manghi, Paolo; Mannocci, Andrea
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Transfer of bacteriophages between the fingers of volunteers and water or saliva
Pitol, Ana Karina; Bischel, HN; Kohn, T; Julian, Tim
Data sets on the percentage of virus transferred between fingers and water or saliva. Transfer with saliva is for both wet hands (where the virus inoculum was not allowed to appreciably dry before transfer) and for dry hands (where the virus inoculum was allowed to dry before transfer). The data...
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Zenodo now supports usage statistics!
Read more about it, in our newest blog post.
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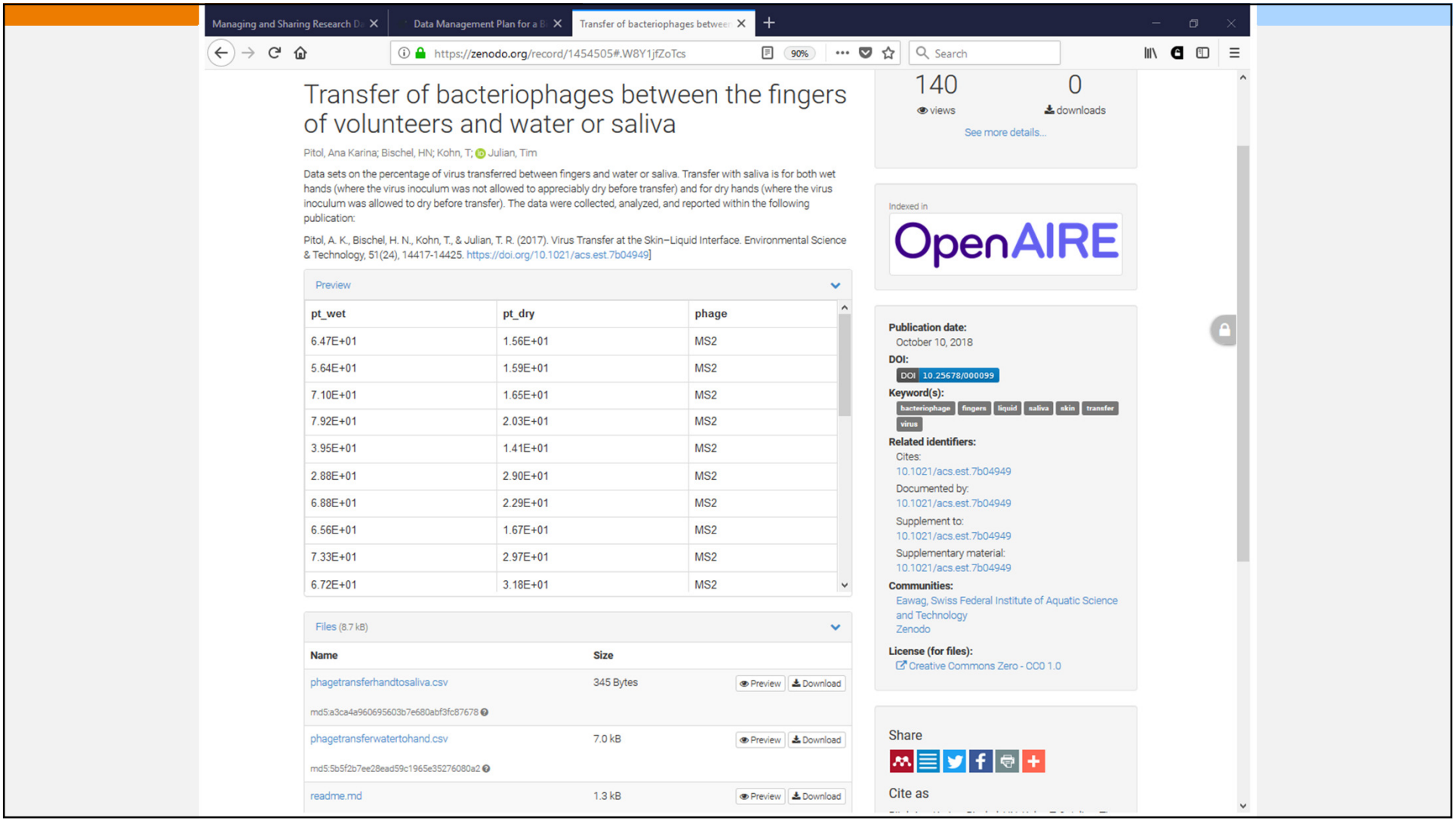
Zenodo in a nutshell
Research. Shared. – all research outputs from across all fields of research are welcome! Sciences and Humanities, really!
Citeable. Discoverable. – uploads gets a Digital Object Identifier (DOI) to make them easily and uniquely citeable.
Communities – create and curate your own community 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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Transfer of bacteriophages between the fingers of volunteers and water or saliva
Pitol, Ana Karina; Bischel, HN; Kohn, T; Julian, Tim
Data sets on the percentage of virus transferred between fingers and water or saliva. Transfer with saliva is for both wet hands (where the virus inoculum was not allowed to appreciably dry before transfer) and for dry hands (where the virus inoculum was allowed to dry before transfer). The data were collected, analyzed, and reported within the following publication:
Pitol, A. K., Bischel, H. N., Kohn, T., & Julian, T. R. (2017). Virus Transfer at the Skin–Liquid Interface. Environmental Science & Technology, 51(24), 14417-14425. https://doi.org/10.1021/acs.est.7b04949]
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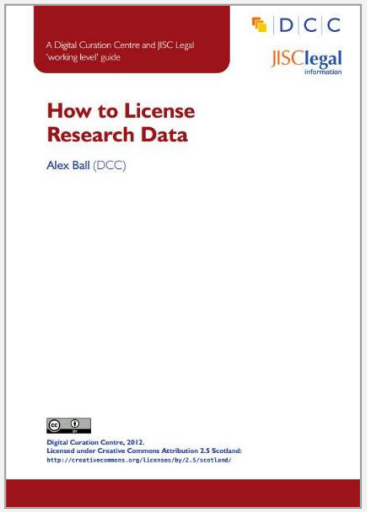
Licensing research data



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?

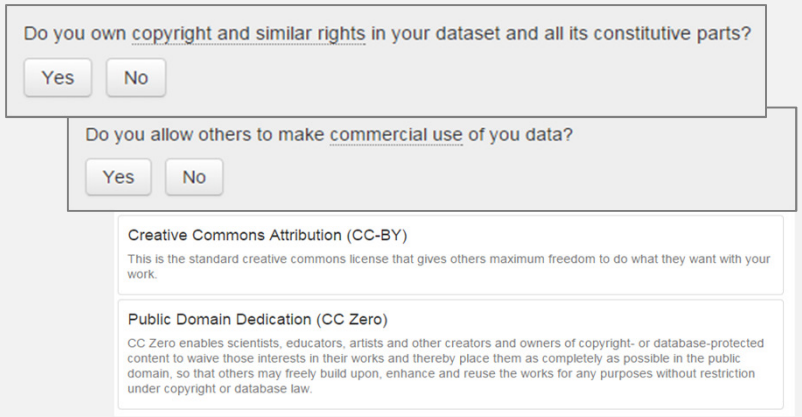
ND No Derivatives
Severely restricts use

These clauses are not open licenses

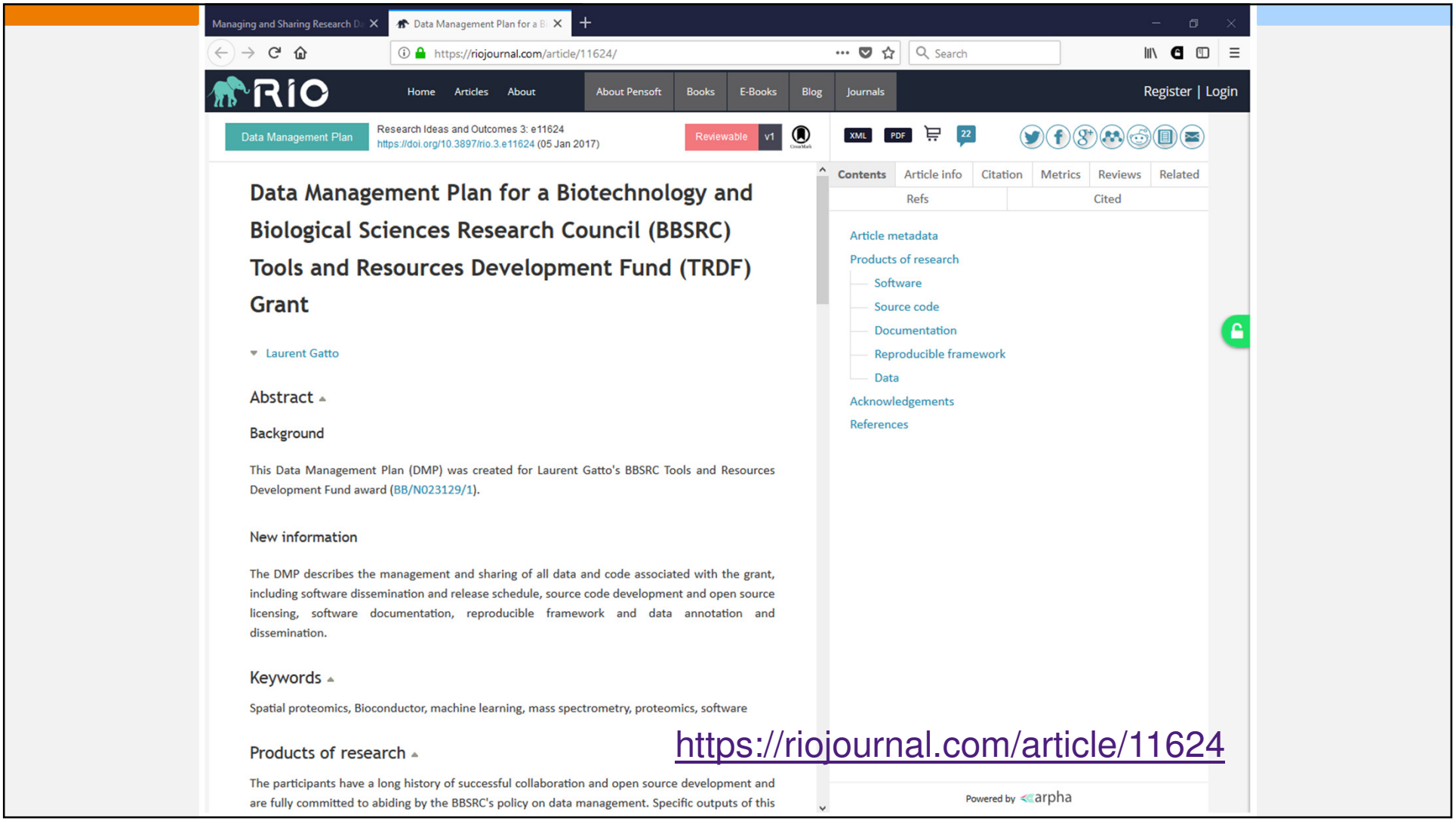
www.dcc.ac.uk/resources/how-guides/license-research-data

EUDAT licensing tool

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



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



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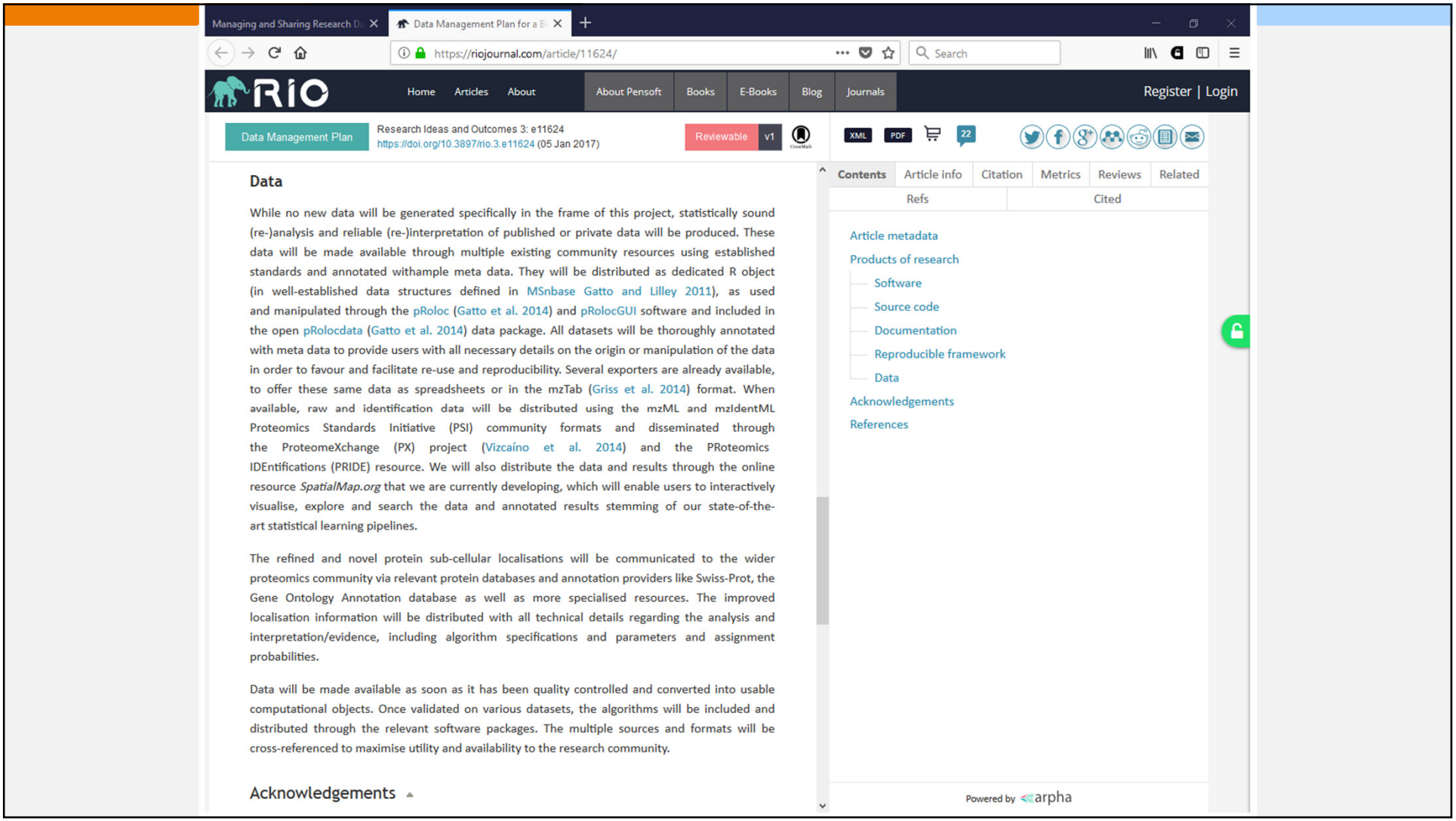
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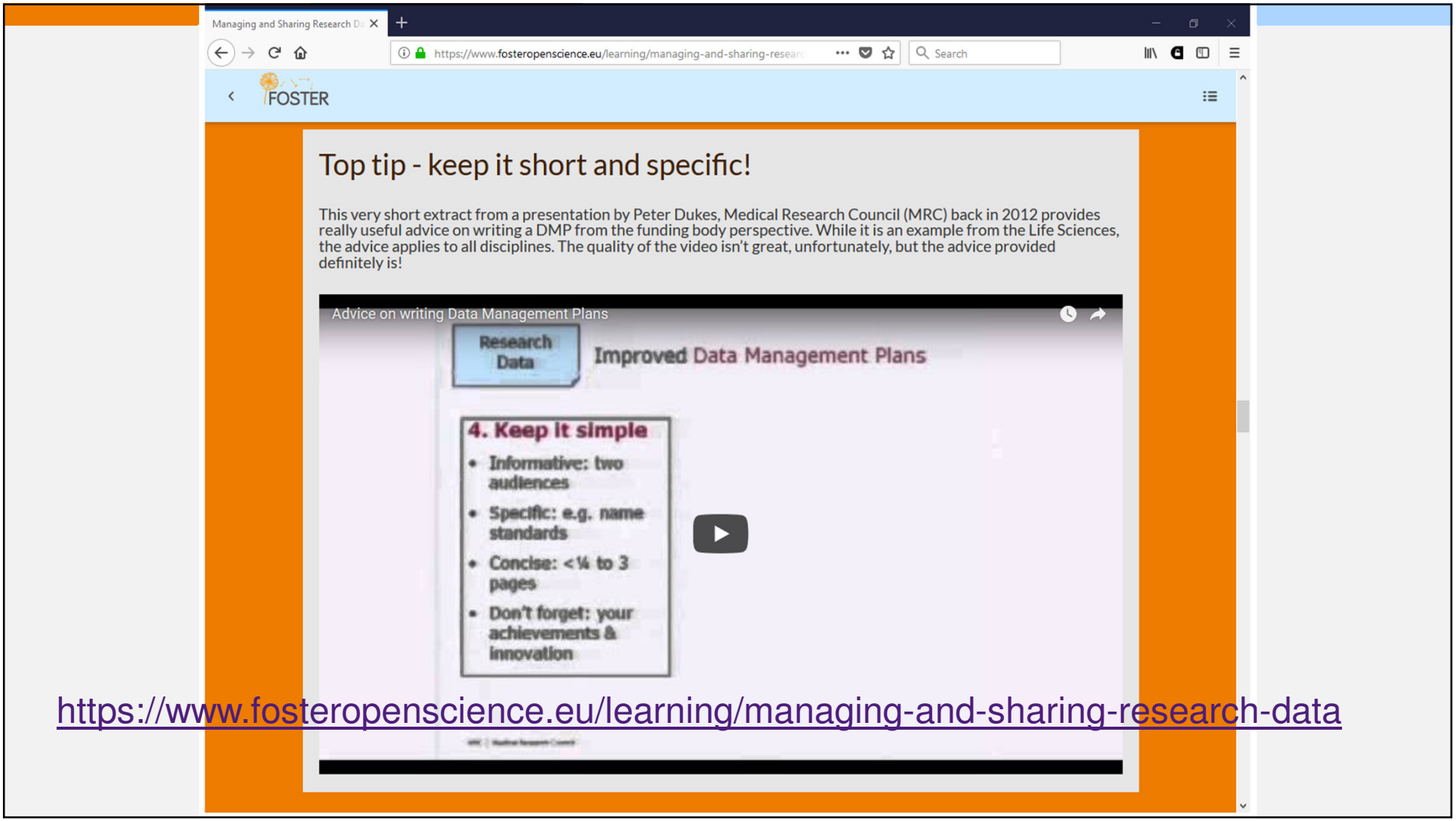
Data
While no new data will be generated specifically in the frame of this project, statistically sound (re-)analysis and reliable (re-)interpretation of published or private data will be produced. These data will be made available through multiple existing community resources using established standards and annotated withample meta data. They will be distributed as dedicated R object (in well-established data structures defined in MSnbase Gatto and Lilley 2011), as used and manipulated through the pRoloc (Gatto et al. 2014) and pRolocGUI software and included in the open pRolocdata (Gatto et al. 2014) data package. All datasets will be thoroughly annotated with meta data to provide users with all necessary details on the origin or manipulation of the data in order to favour and facilitate re-use and reproducibility. Several exporters are already available, to offer these same data as spreadsheets or in the mzTab (Griss et al. 2014) format. When available, raw and identification data will be distributed using the mzML and mzIdentML Proteomics Standards Initiative (PSI) community formats and disseminated through the ProteomeXchange (PX) project (Vizcaíno et al. 2014) and the PRoteomics IDEntifications (PRIDE) resource. We will also distribute the data and results through the online resource *SpatialMap.org* that we are currently developing, which will enable users to interactively visualise, explore and search the data and annotated results stemming of our state-of-the-art statistical learning pipelines.
The refined and novel protein sub-cellular localisations will be communicated to the wider proteomics community via relevant protein databases and annotation providers like Swiss-Prot, the Gene Ontology Annotation database as well as more specialised resources. The improved localisation information will be distributed with all technical details regarding the analysis and interpretation/evidence, including algorithm specifications and parameters and assignment probabilities.
Data will be made available as soon as it has been quality controlled and converted into usable computational objects. Once validated on various datasets, the algorithms will be included and distributed through the relevant software packages. The multiple sources and formats will be cross-referenced to maximise utility and availability to the research community.
Acknowledgements



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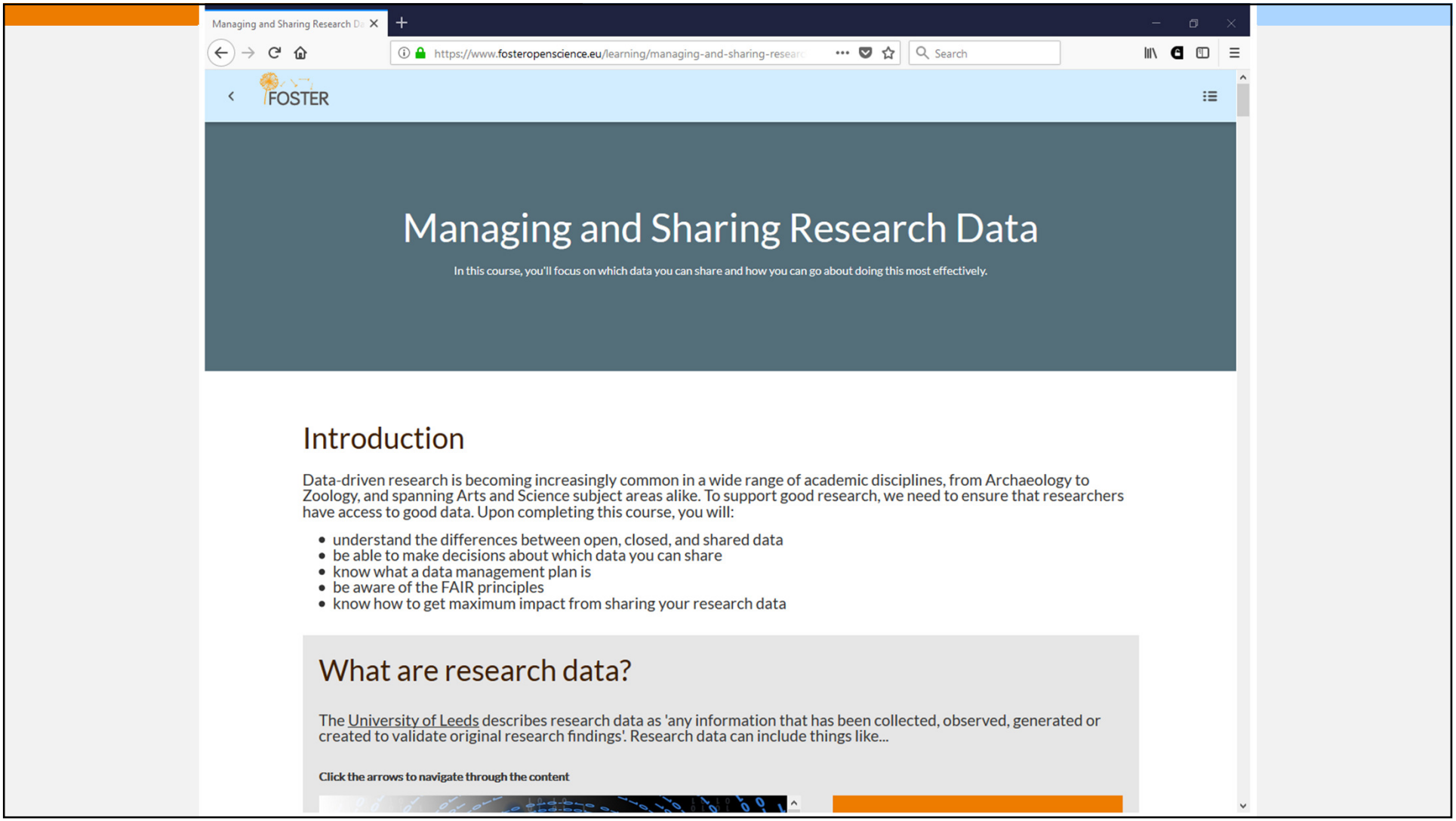
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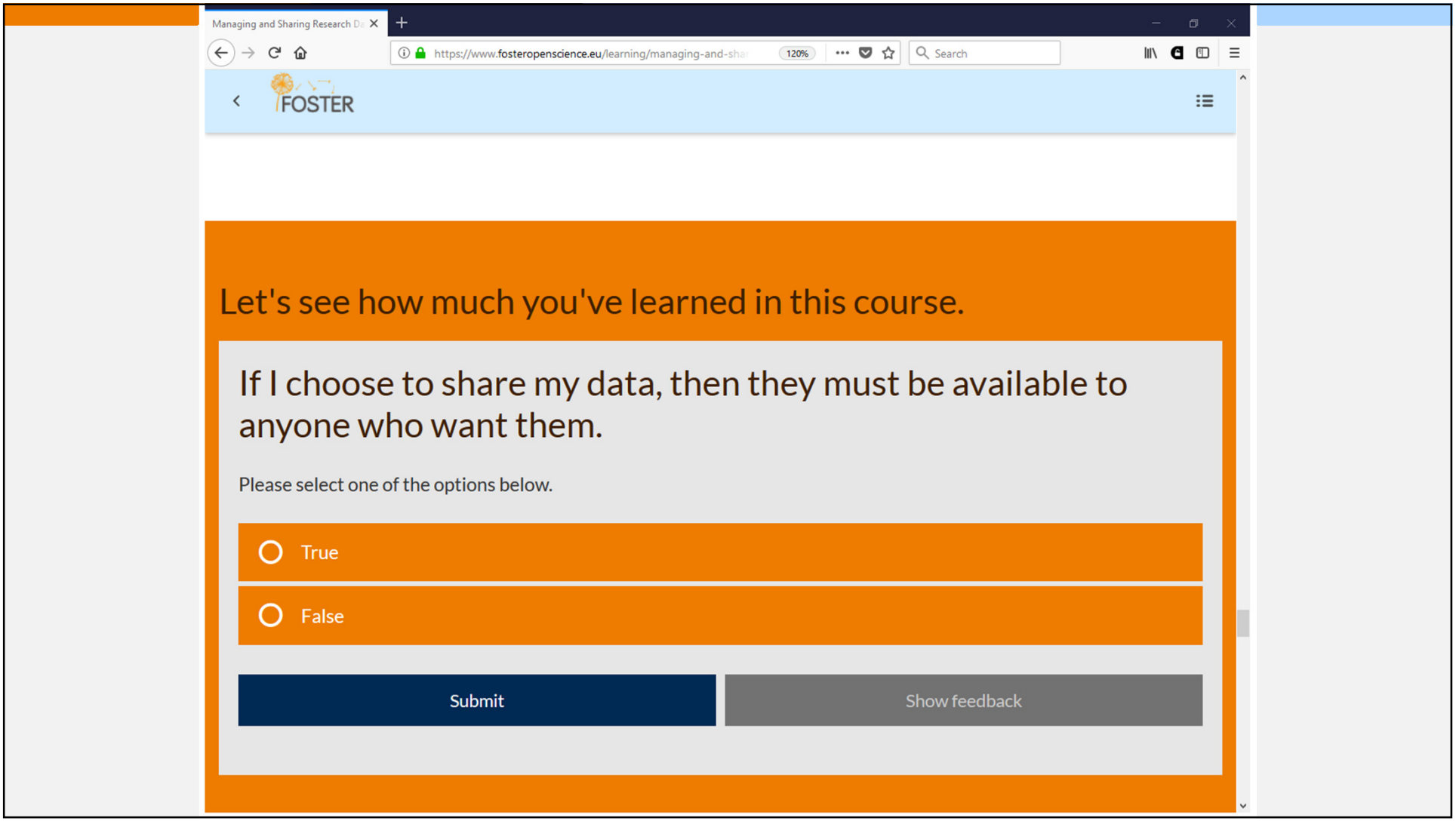
Managing and Sharing Research Data
In this course, you'll focus on which data you can share and how you can go about doing this most effectively.
Introduction
Data-driven research is becoming increasingly common in a wide range of academic disciplines, from Archaeology to Zoology, and spanning Arts and Science subject areas alike. To support good research, we need to ensure that researchers have access to good data. Upon completing this course, you will:
understand the differences between open, closed, and shared data
be able to make decisions about which data you can share
know what a data management plan is
be aware of the FAIR principles
know how to get maximum impact from sharing your research data
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...
Click the arrows to navigate through the content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If I choose to share my data, then they must be available to anyone who want them.
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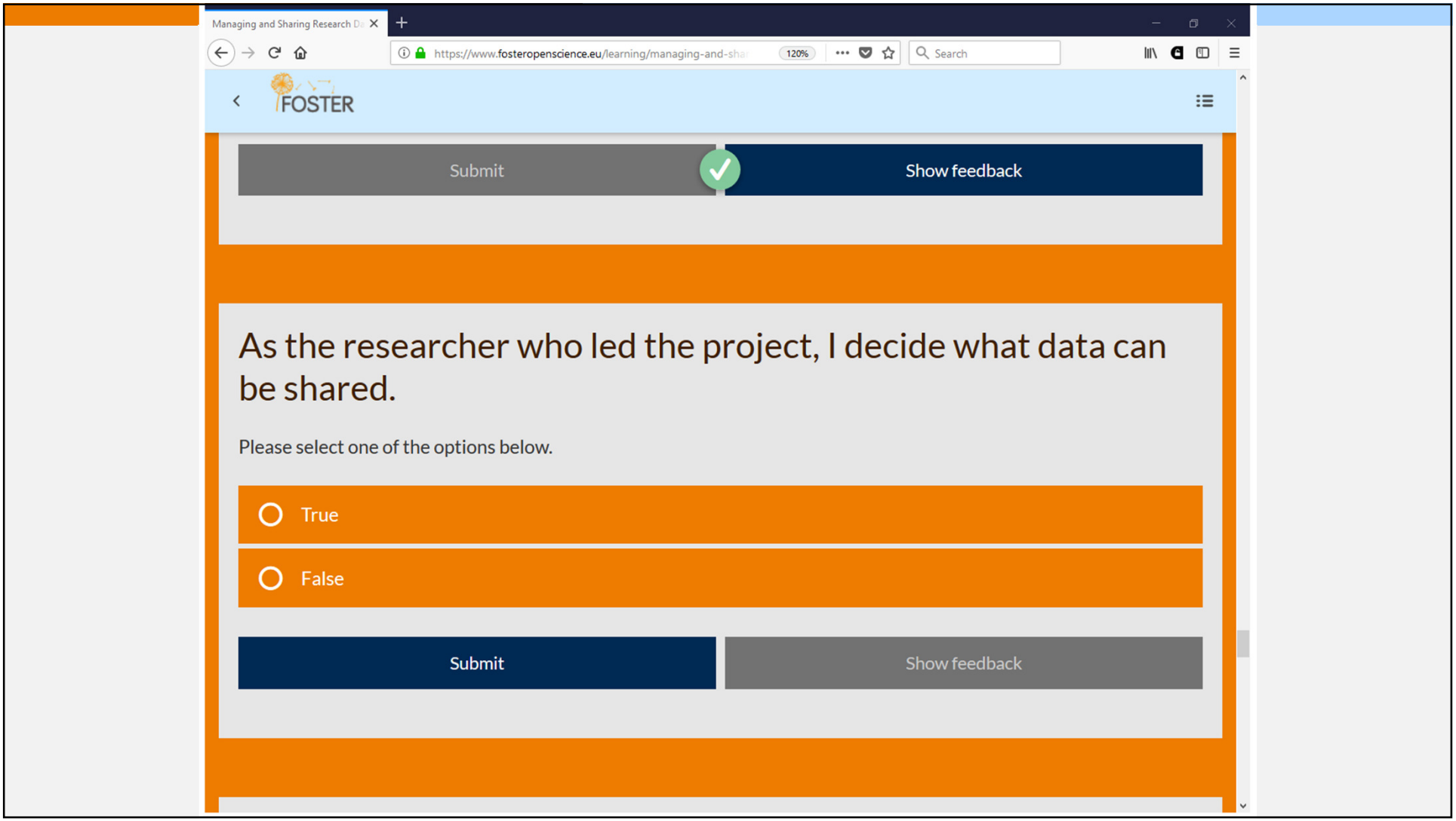
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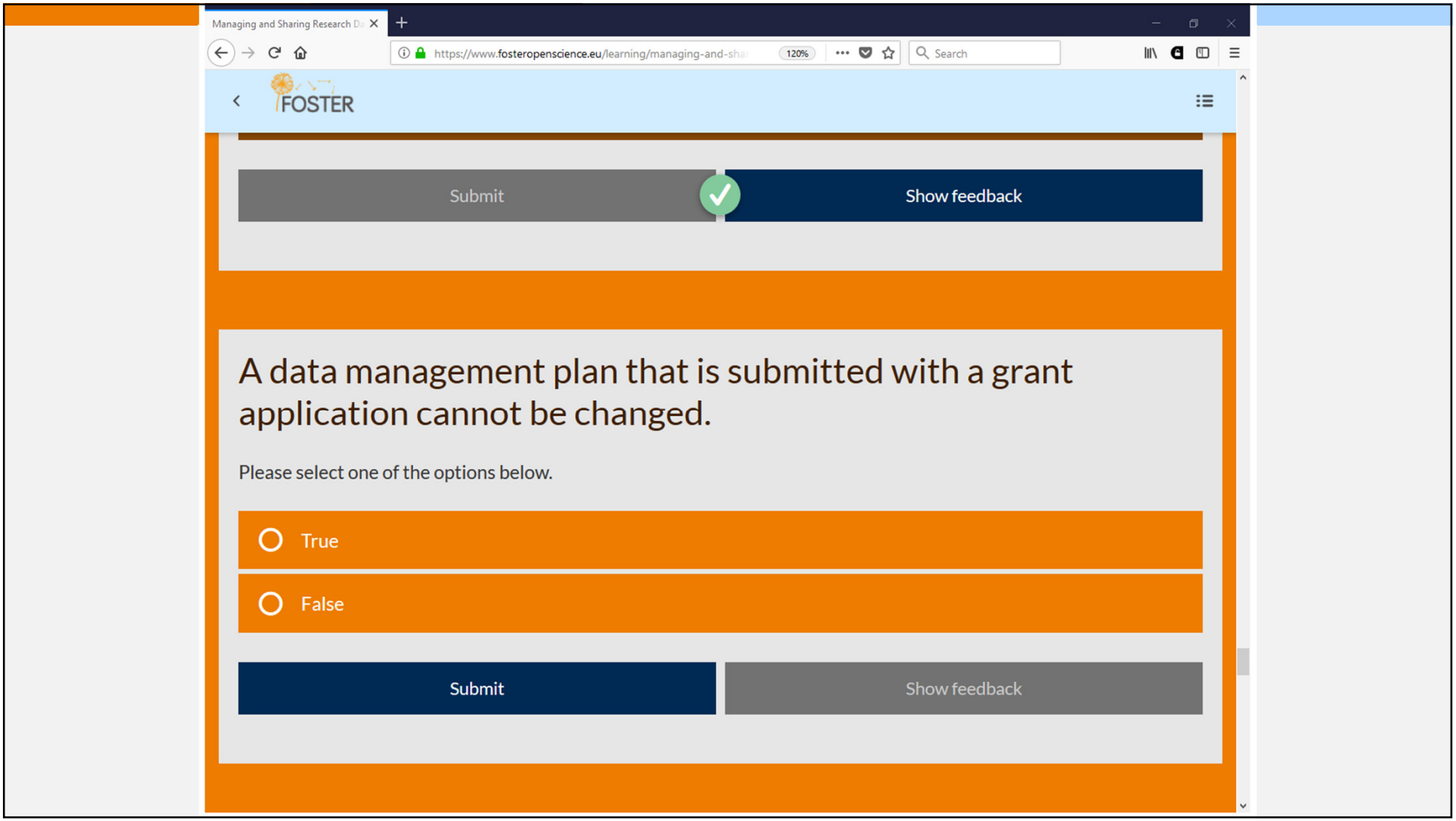
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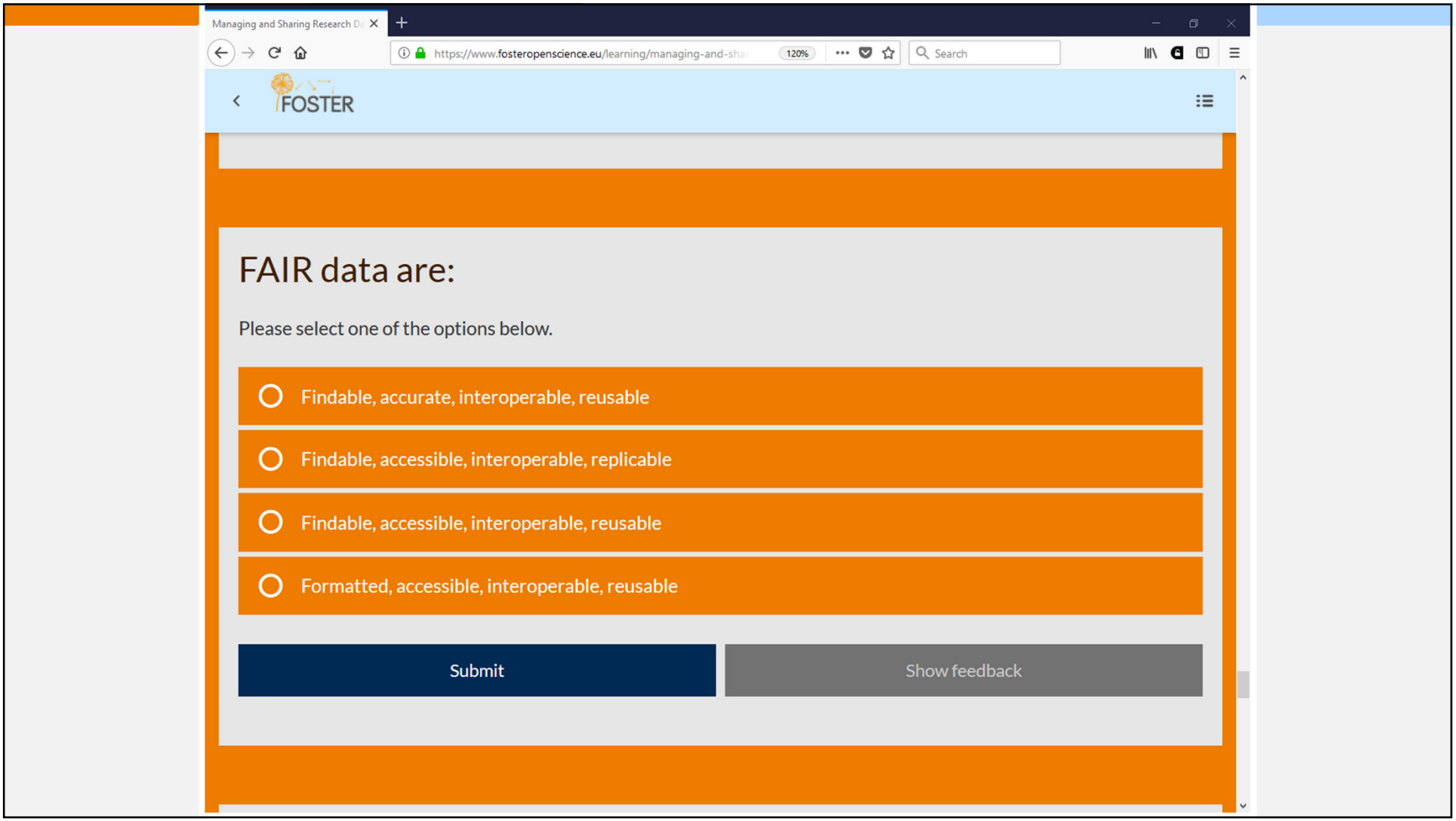
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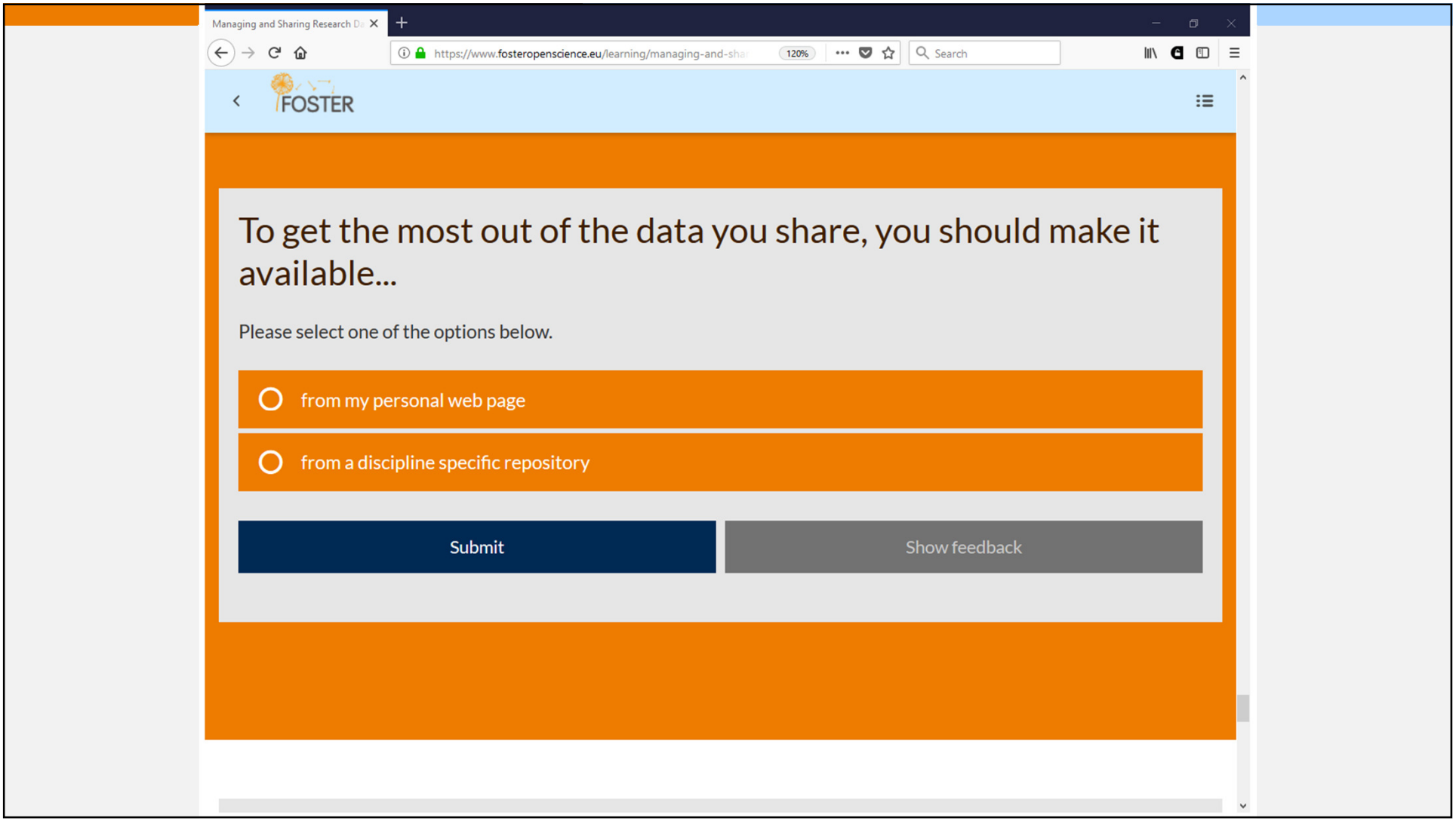
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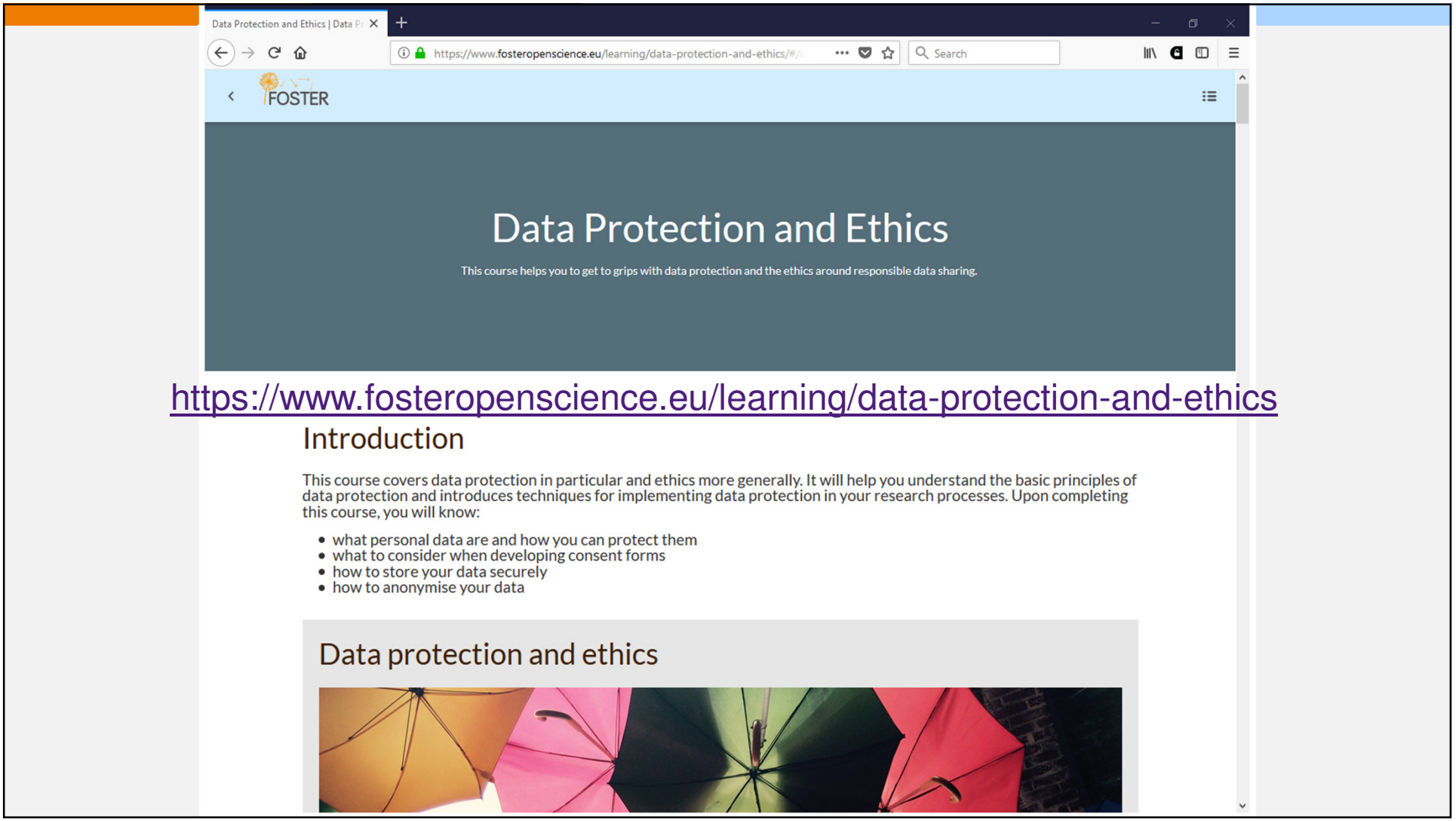
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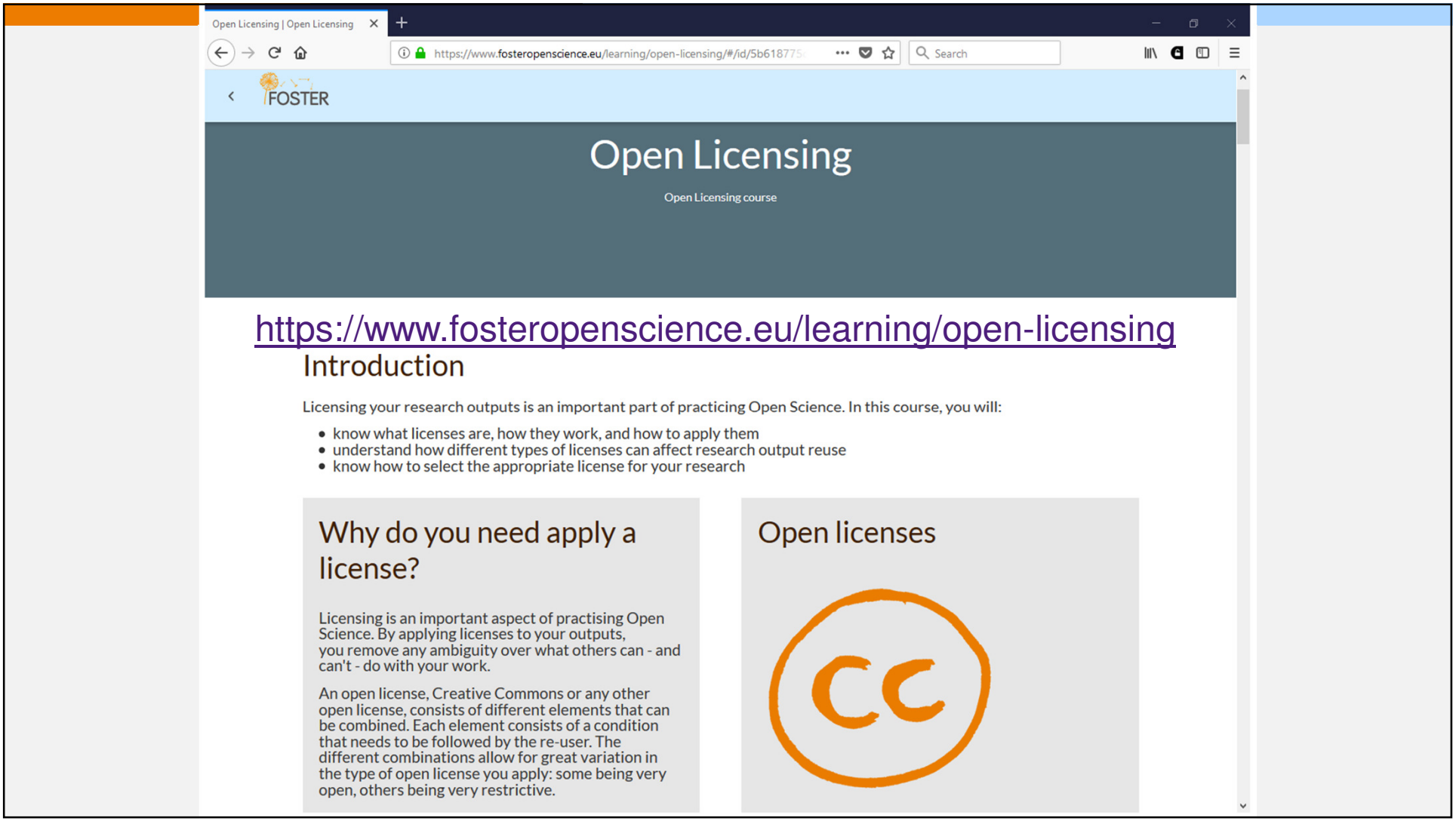
Introduction
This course covers data protection in particular and ethics more generally. It will help you understand the basic principles of data protection and introduces techniques for implementing data protection in your research processes. Upon completing this course, you will know:
what personal data are and how you can protect them
what to consider when developing consent forms
how to store your data securely
how to anonymise your data
Data protection and ethics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Licensing your research outputs is an important part of practicing Open Science. In this course, you will:
know what licenses are, how they work, and how to apply them
understand how different types of licenses can affect research output reuse
know how to select the appropriate license for your research
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Licensing is an important aspect of practising Open Science. By applying licenses to your outputs, you remove any ambiguity over what others can - and can't - do with your work.
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Open licenses

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 RDM Handbook https://www.openaire.eu/rdm-handbook

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

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Joy Davidson, University of Glasgow
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Why should data be open? Benefits of Open Access to research data

Iryna Kuchma, EIFL Open Access Programme Manager, @irynakuchma

Health NCP Net 2.0 Training Open Access & Data Management in Horizon 2020, EKT

19th October 2018

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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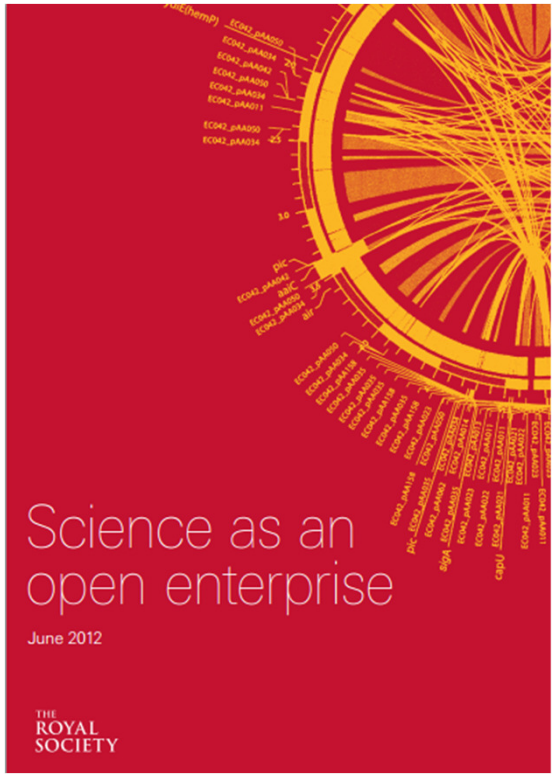
Science as an open enterprise

"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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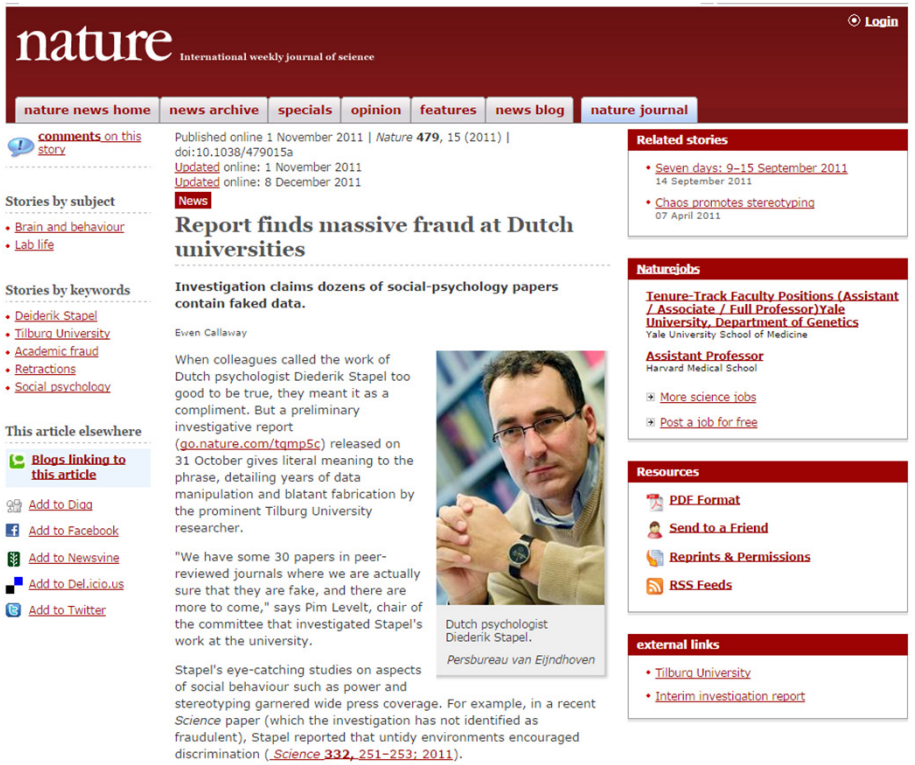
Cut down on academic fraud



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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.

Even 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.

"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).

Dutch psychologist Diederik Stapel.

Persbureau van Eijndhoven

Related stories
- Seven days: 9–15 September 2011 (14 September 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

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.

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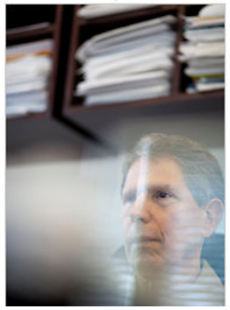

Now, the effort is bearing fruit with a wealth of recent scientific papers on the early diagnosis of Alzheimer's using methods like PET scans and tests of spinal fluid. More than 100 studies are under way to test drugs that might slow or stop the disease.

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:

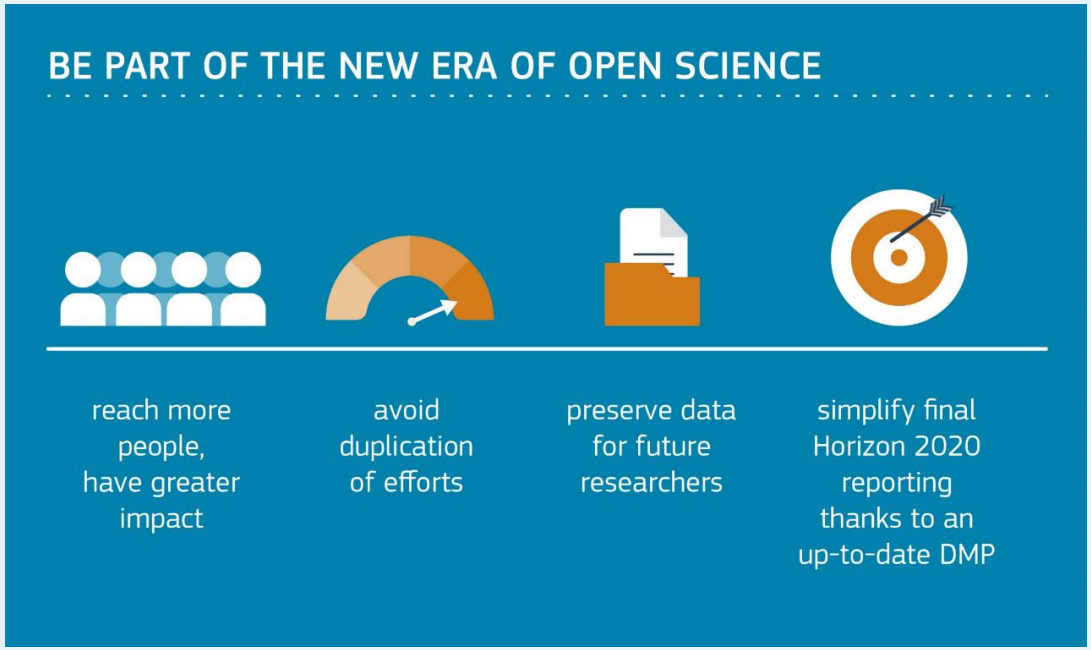
Up to 2008

- 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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2011 Germany *E. coli* O104:H4 outbreak

The strain was analyzed by scientists at BGI-Shenzen in China working together with those in Hamburg, and **3 days later a draft genome was released under an open data license**.

This kick-started analysis by bioinformatic groups on **4 continents**.

2011 Germany *E. coli* O104:H4 outbreak (2)

24 hours after the release of genome it was assembled.

Within a week **two dozen reports have been filed on an open site.**

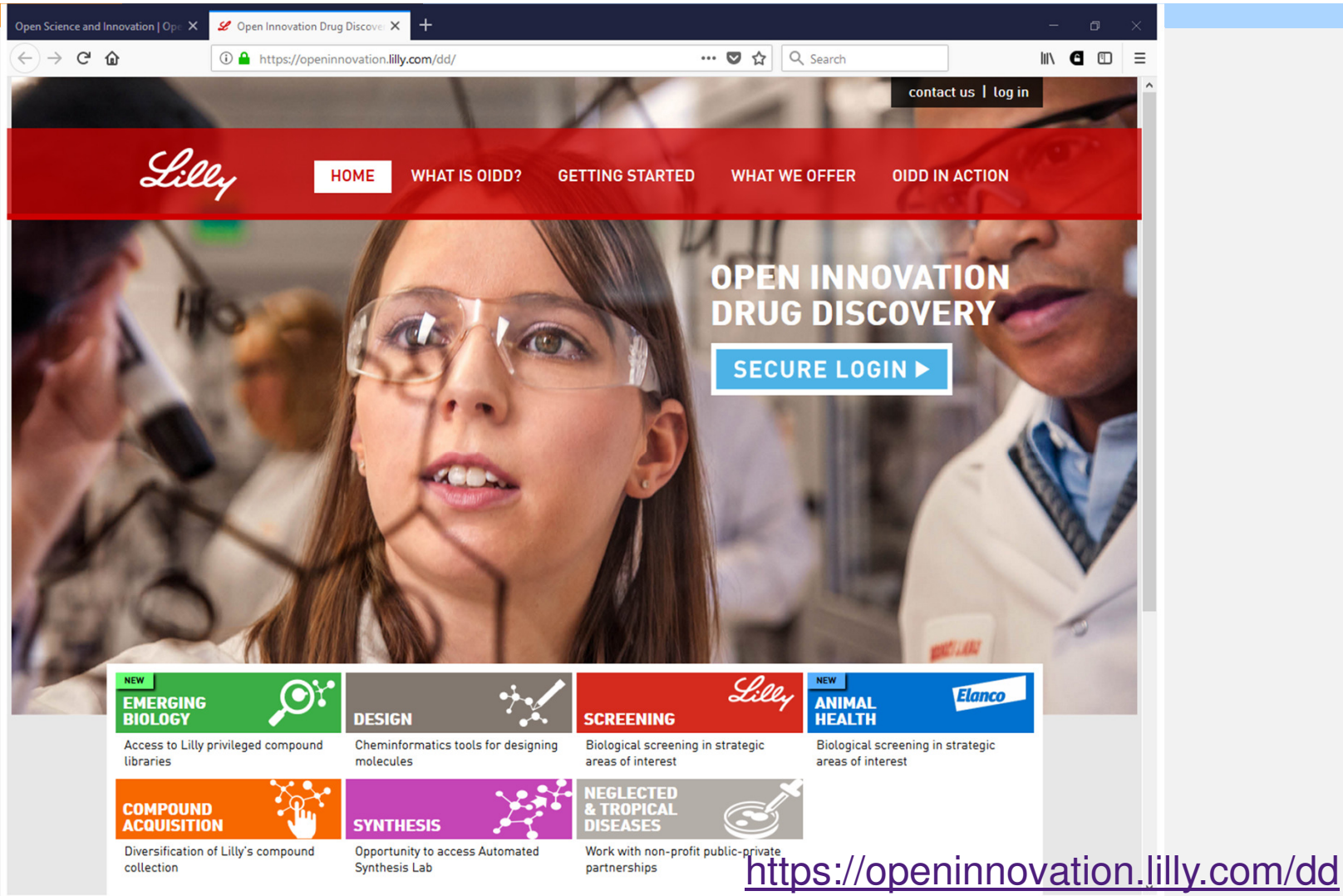
2011 Germany *E. coli* O104:H4 outbreak (3)

They produced results in time to help contain the outbreak and by July 2011 scientists published papers based on the analysis.

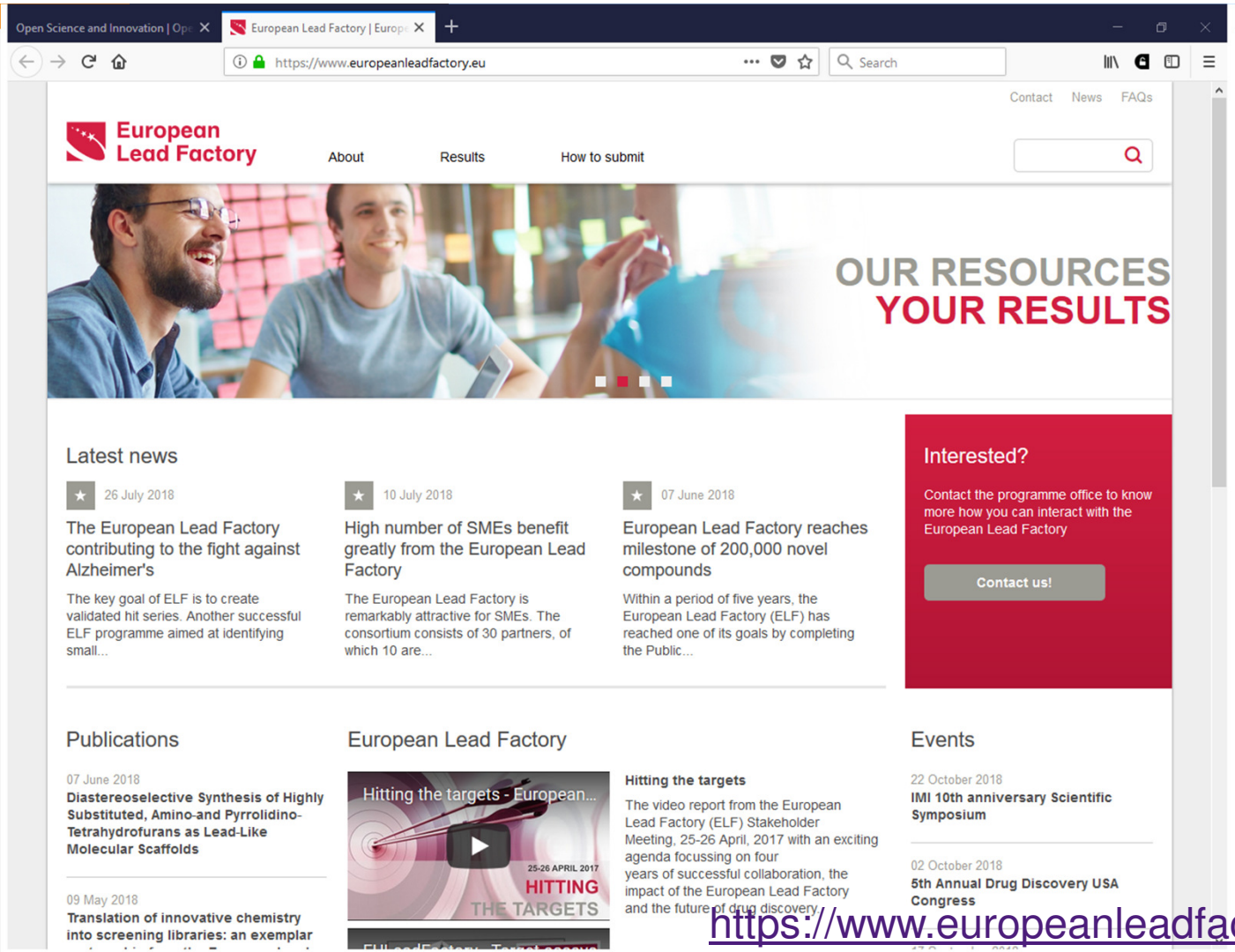
2011 Germany *E. coli* O104:H4 outbreak (4)

By opening up their early sequencing results to international collaboration, researchers in Hamburg produced results that were quickly tested by a wide range of experts, used to produce new knowledge and ultimately to control a public health emergency.

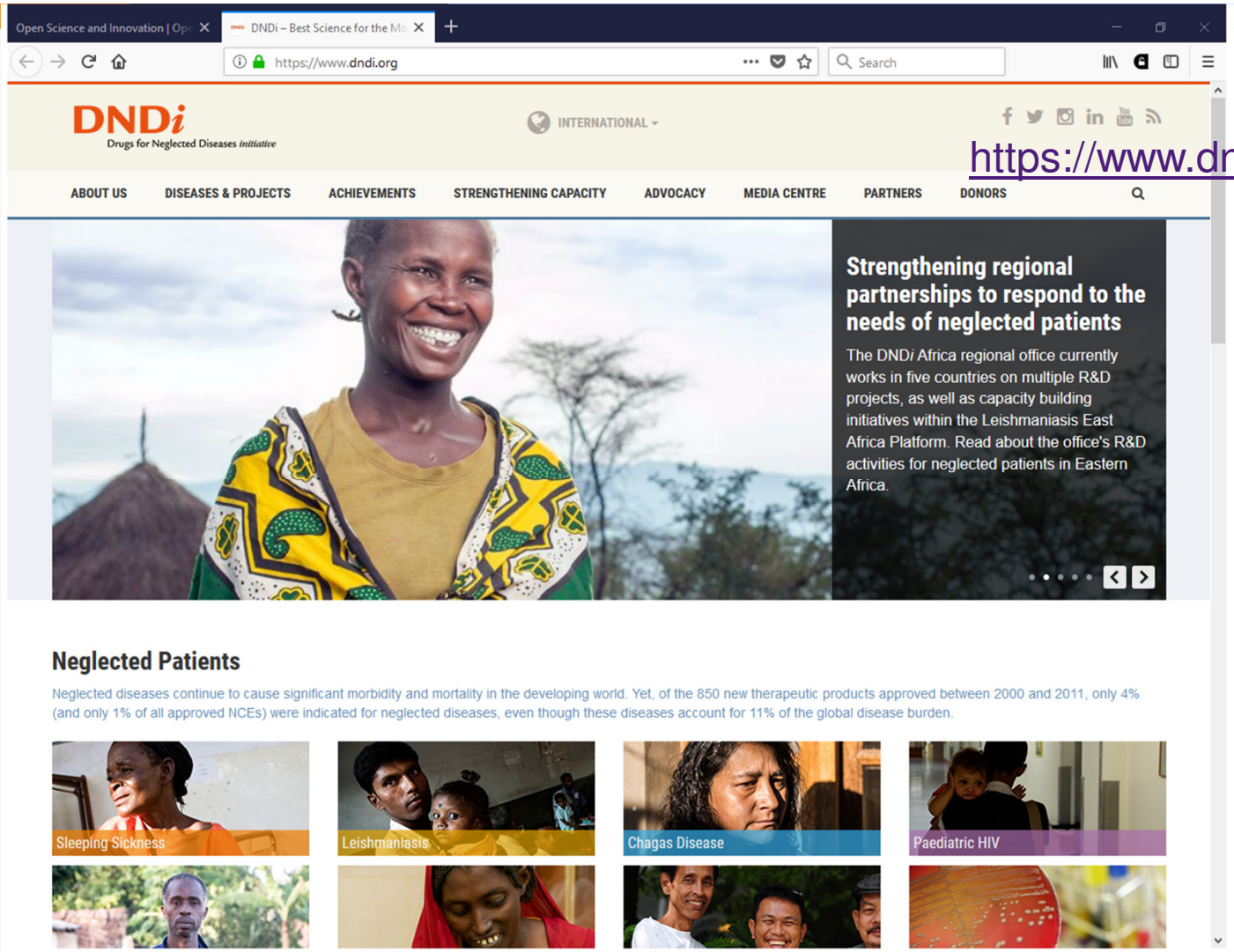
https://www.thesgc.org



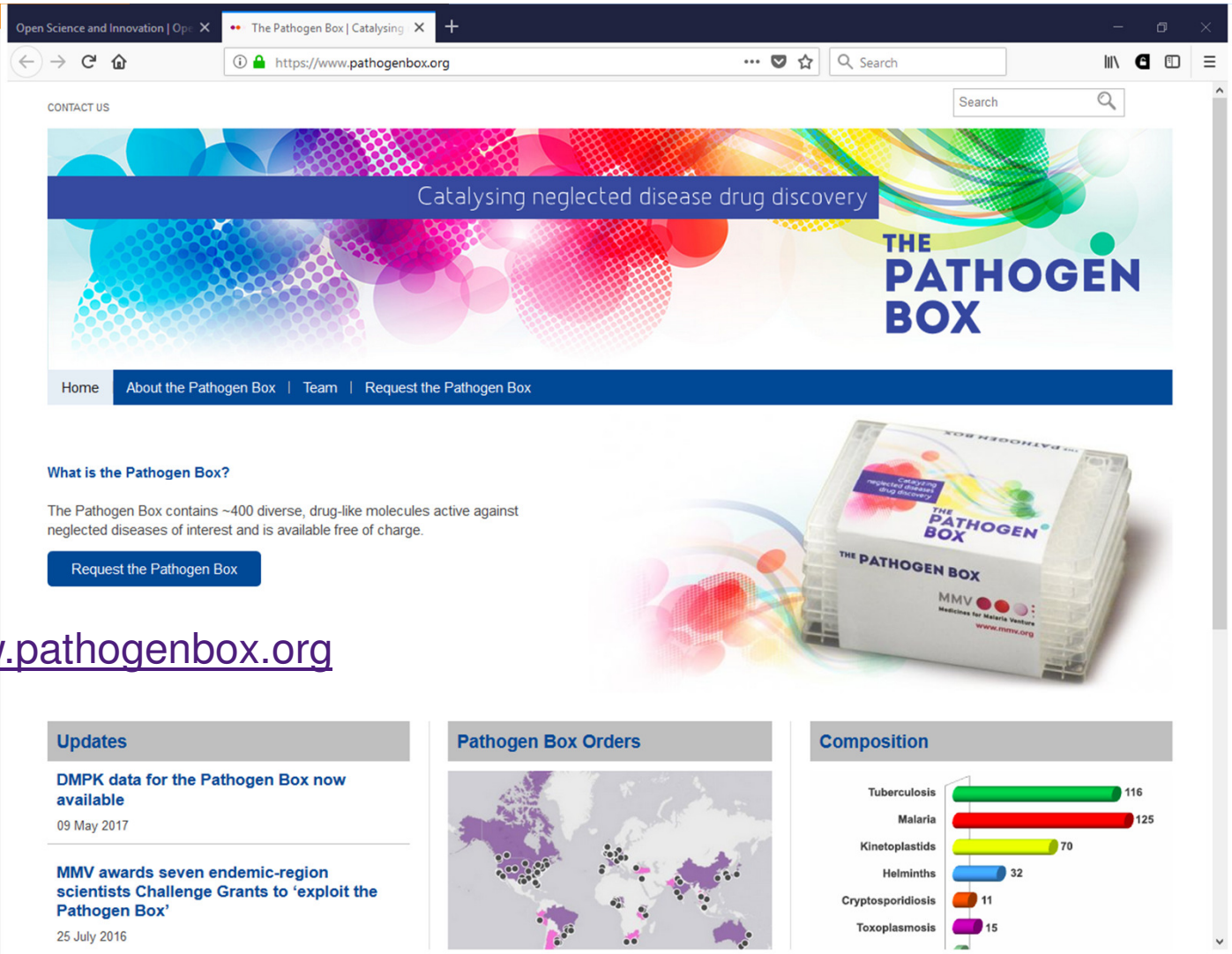
https://openinnovation.lilly.com/dd



https://www.europeanleadfactory.eu

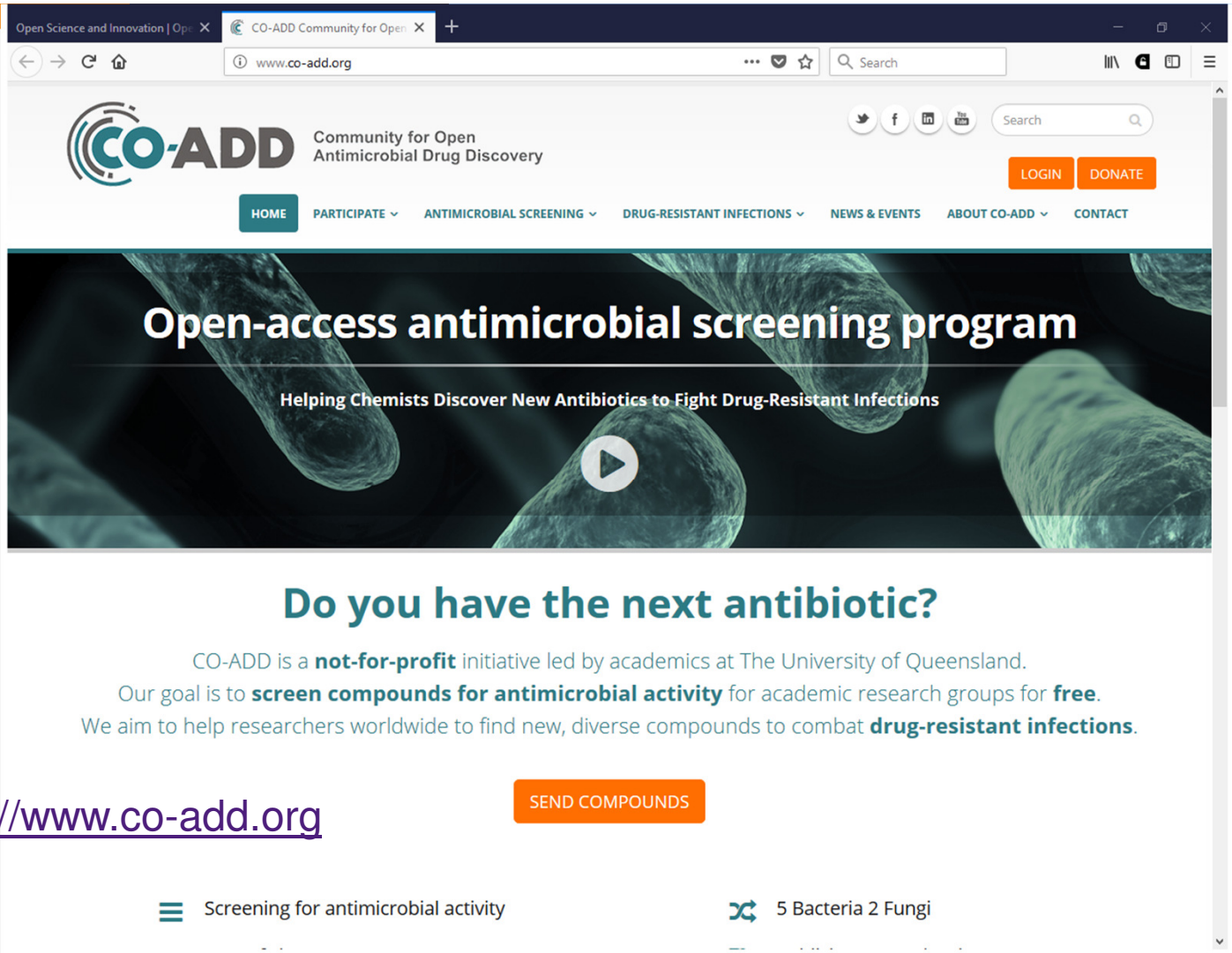


https://www.dndi.org



https://www.pathogenbox.org

http://opensourcemalaria.org



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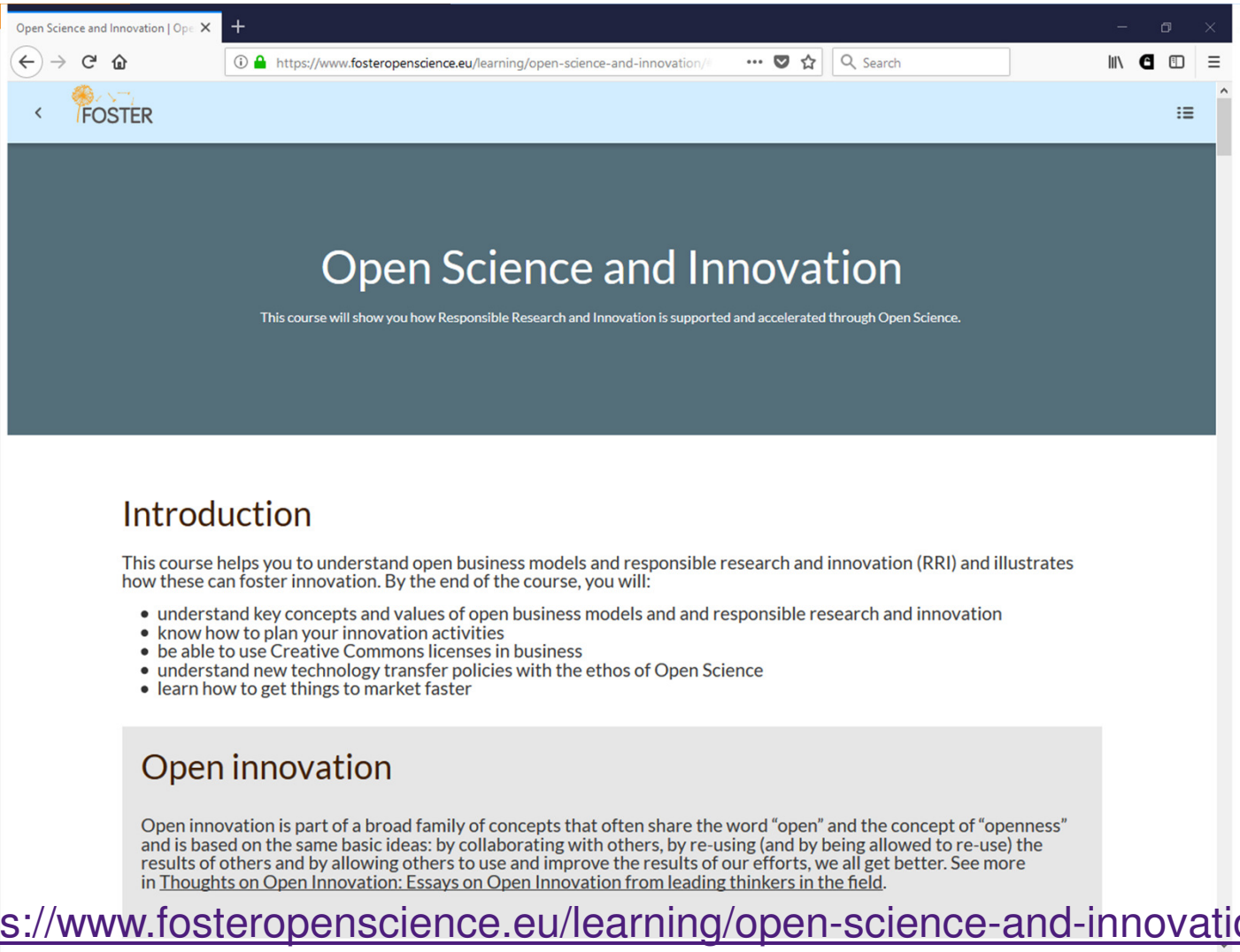

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Sarah Jones, DCC
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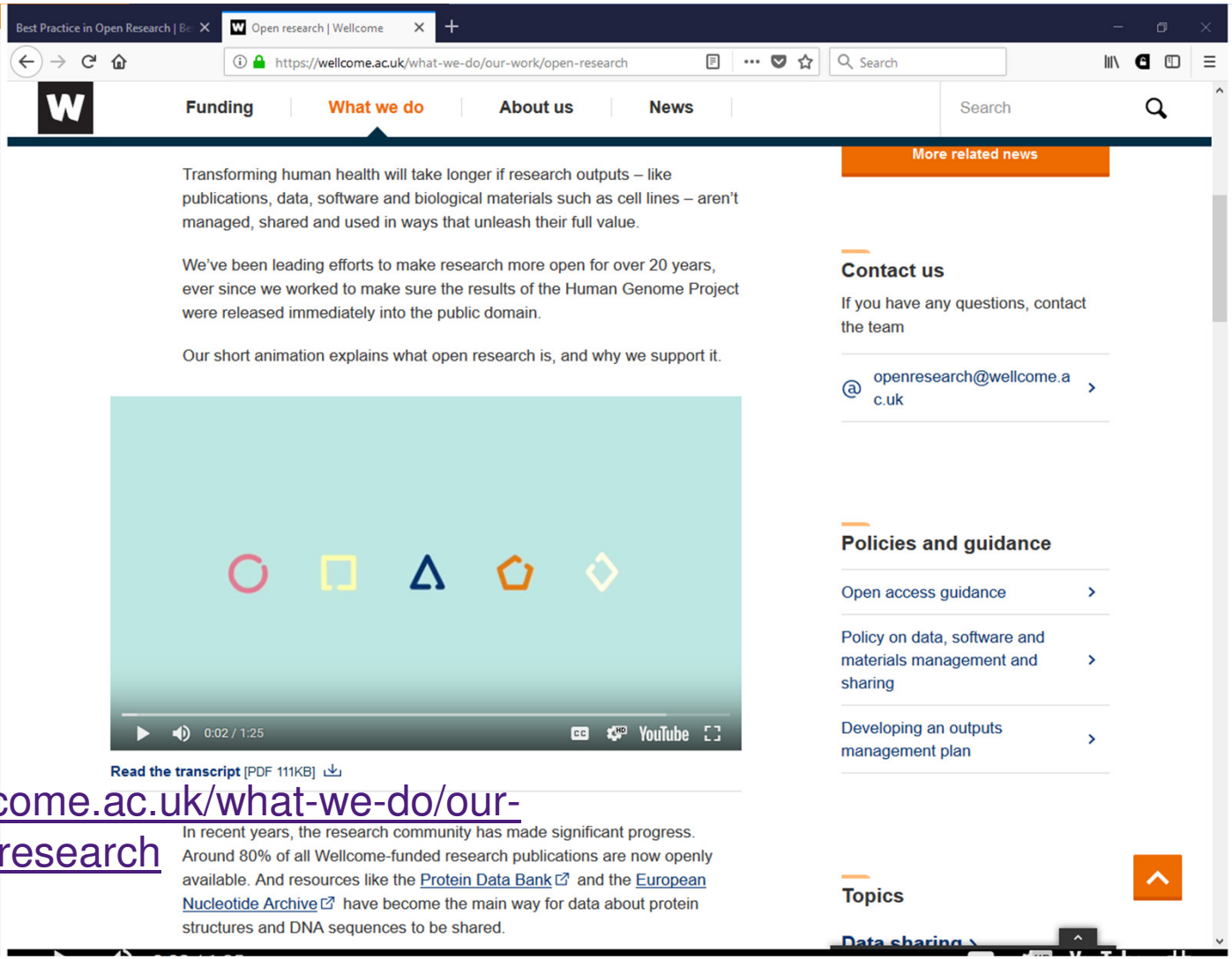
Winning H2020 with Open Science: How to gain a competitive evaluation advantage?



https://wellcome.ac.uk/what-we-do/our-work/open-research

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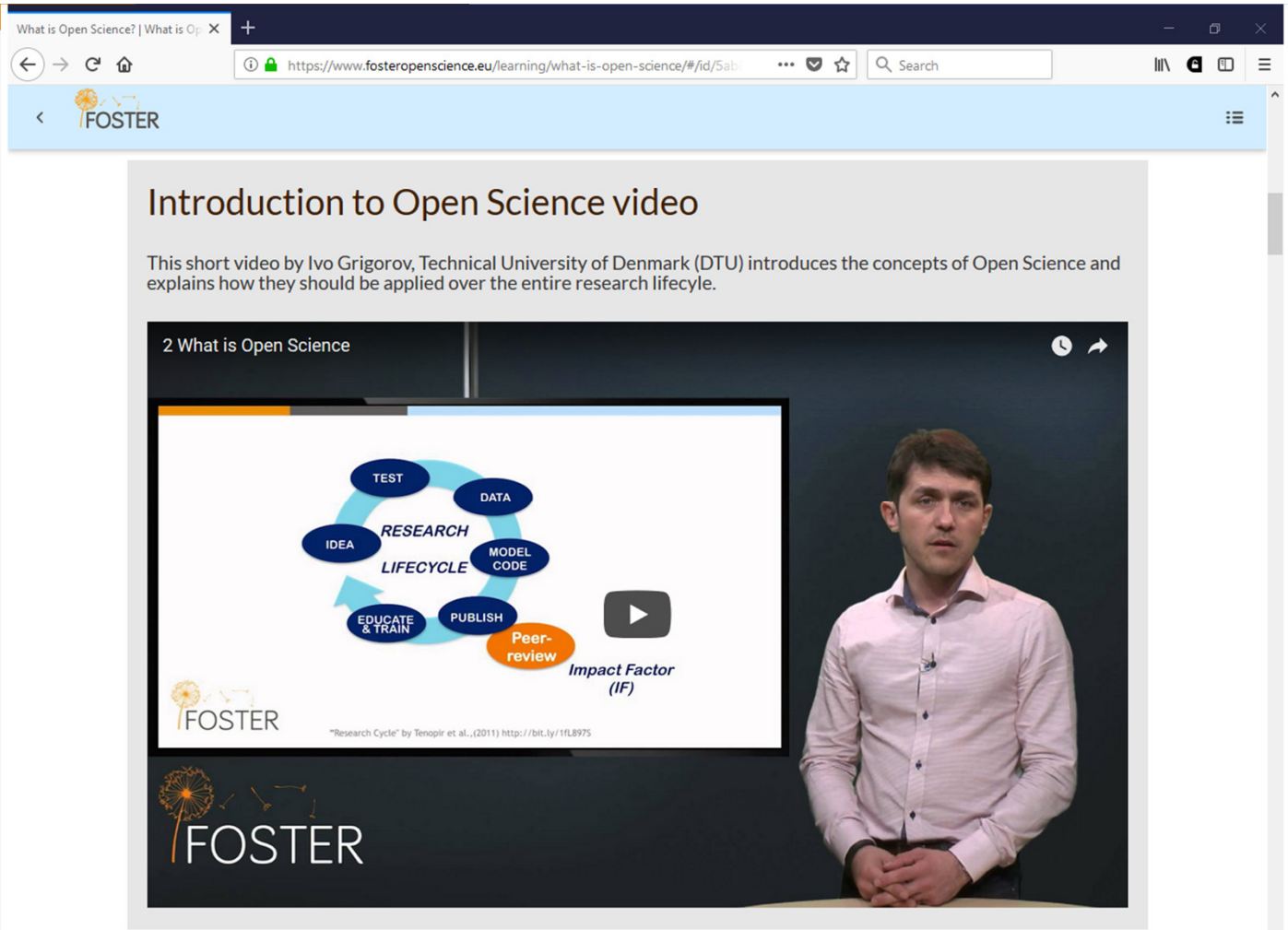

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What are the political motivations

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Council of the European Union

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ACKNOWLEDGES that Open Science has the potential to increase the quality, impact and benefits of science and to accelerate advancement of knowledge by making it more reliable, more efficient and accurate,

better understandable by society and responsive to societal challenges, and has the potential to enable growth and innovation through reuse of scientific results by all stakeholders at all levels of society, and ultimately contribute to growth and competitiveness of Europe.

Brussels 27 May 2016

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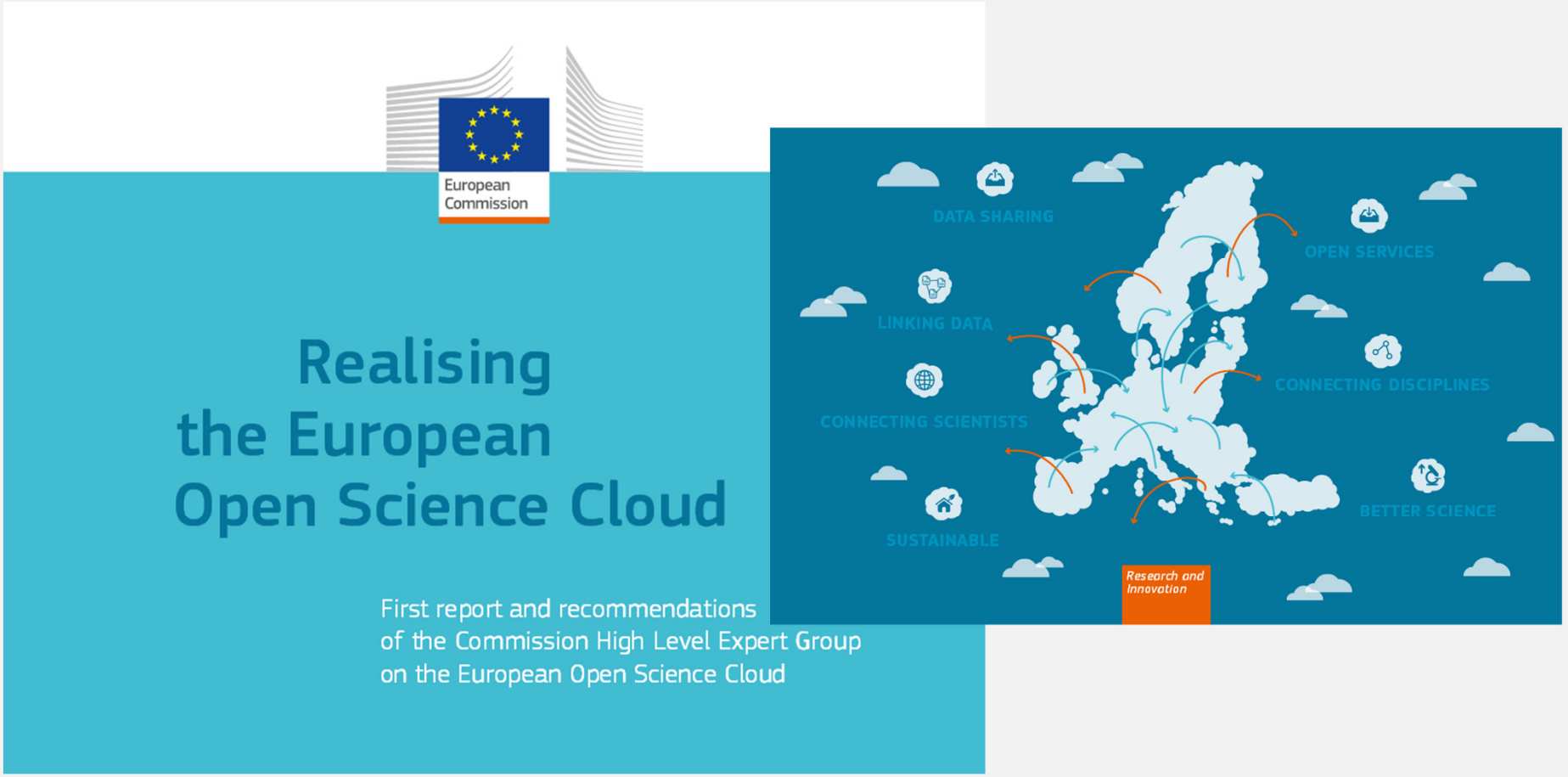
Source: ***EC Competitiveness Council, 26-27/05/2016*** *http://data.consilium.europa.eu/doc/document/ST-9526-2016-INIT/en/pdf*



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Source: ***Realising the European Open Science Cloud DG Research & Innovation 2016***
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> Mostly due to current methods capture and data malpractice, approximately 50% of all research data and experiments is considered **not reproducible**, and the vast majority (likely over 80%) of data never makes it to a trusted and sustainable repository.
>
> At an investment of Europe in data-generating research of €120 Billion between 2014-2020, the **annual capital destruction** is consequently **very substantial**.

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Source: ***Realising the European Open Science Cloud, EC DG Research & Innovation 2016***
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“

This will mean a new way of working through deep, equal partnerships between the science communities and the ICT communities …

… to turn these data into knowledge as renewable, sustainable fuel for innovation in turn to meet global challenges.

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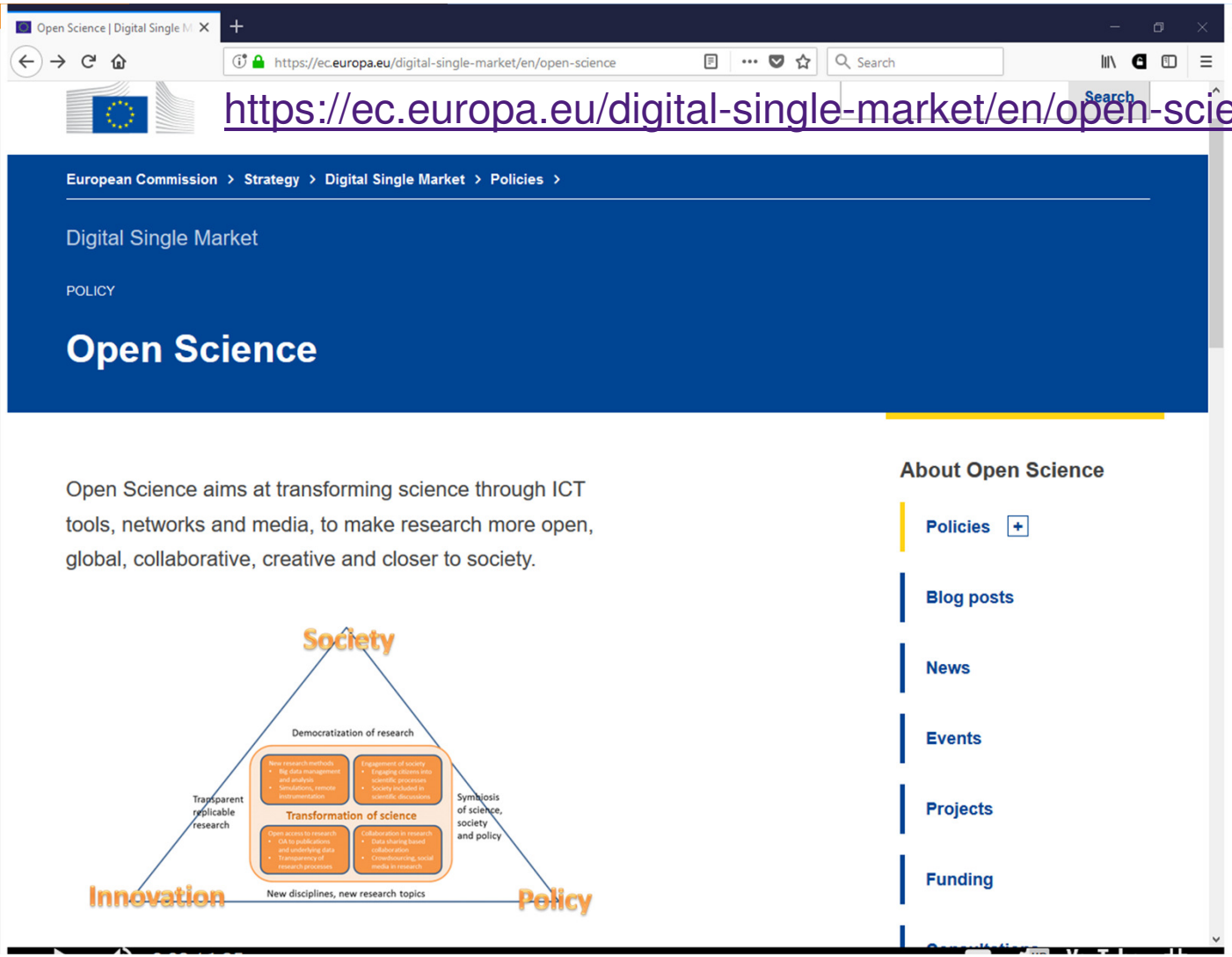
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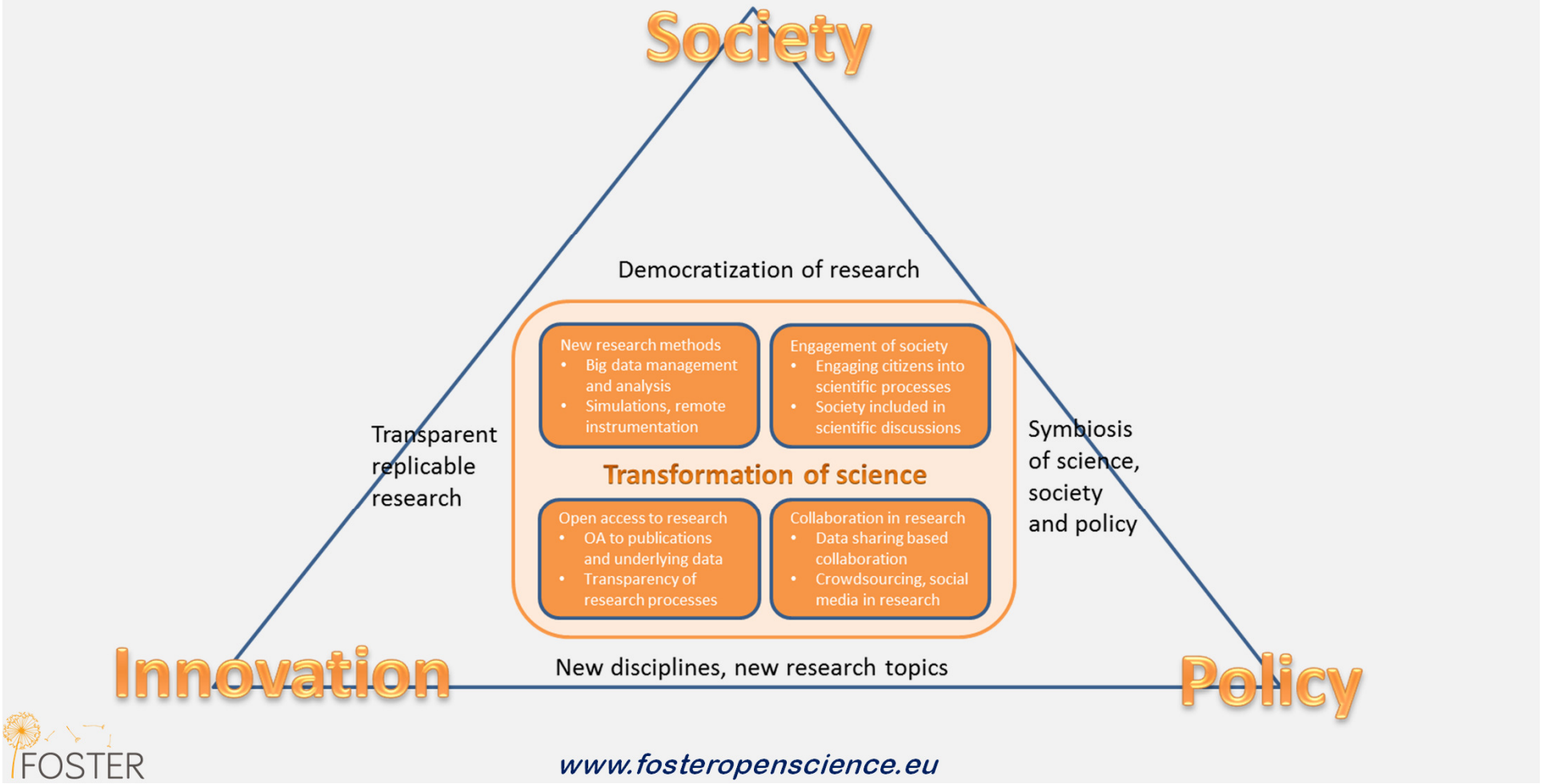

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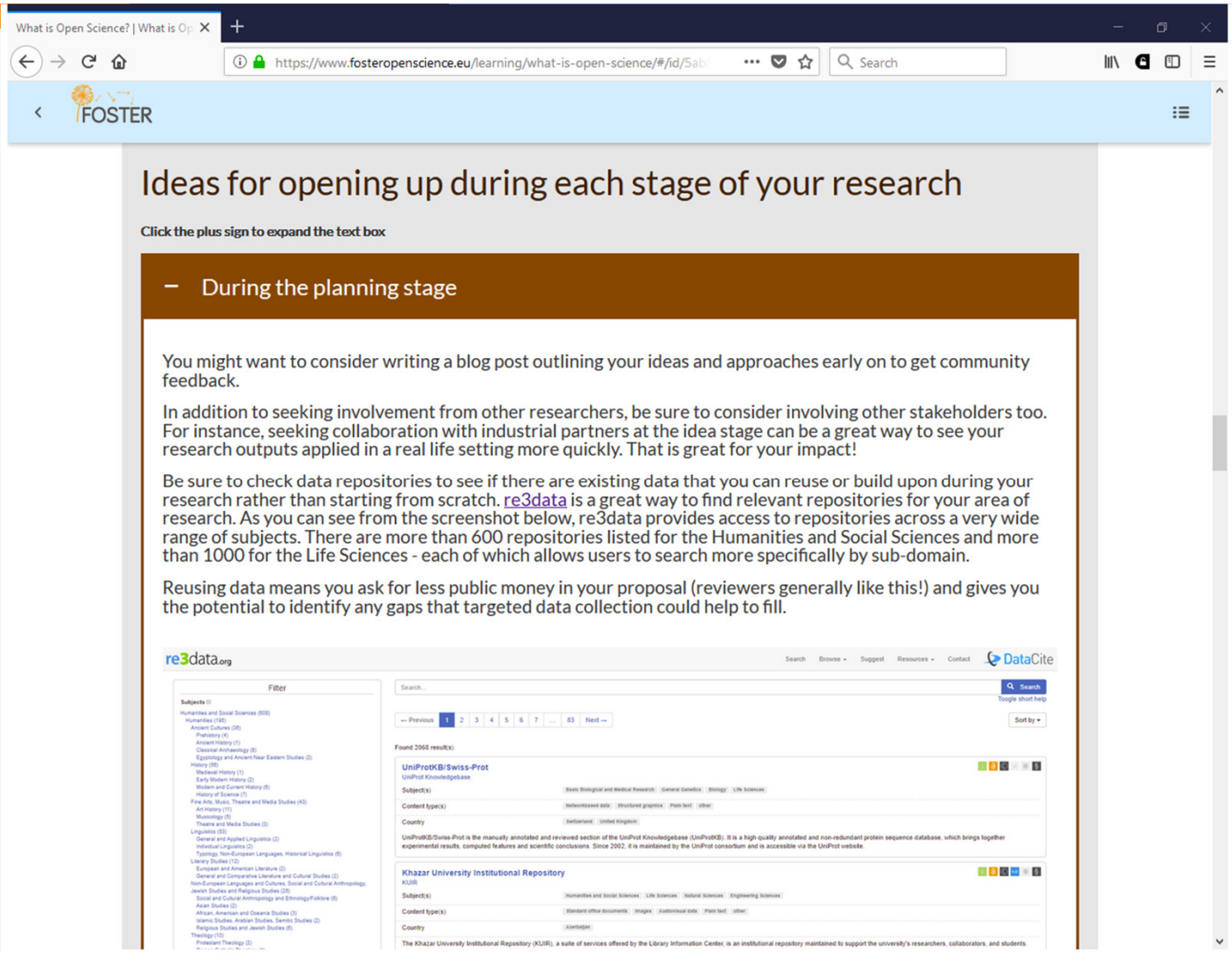
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During the planning stage
You might want to consider writing a blog post outlining your ideas and approaches early on to get community feedback.
In addition to seeking involvement from other researchers, be sure to consider involving other stakeholders too. For instance, seeking collaboration with industrial partners at the idea stage can be a great way to see your research outputs applied in a real life setting more quickly. That is great for your impact!
Be sure to check data repositories to see if there are existing data that you can reuse or build upon during your research rather than starting from scratch. re3data is a great way to find relevant repositories for your area of research. As you can see from the screenshot below, re3data provides access to repositories across a very wide range of subjects. There are more than 600 repositories listed for the Humanities and Social Sciences and more than 1000 for the Life Sciences - each of which allows users to search more specifically by sub-domain.
Reusing data means you ask for less public money in your proposal (reviewers generally like this!) and gives you the potential to identify any gaps that targeted data collection could help to fill.
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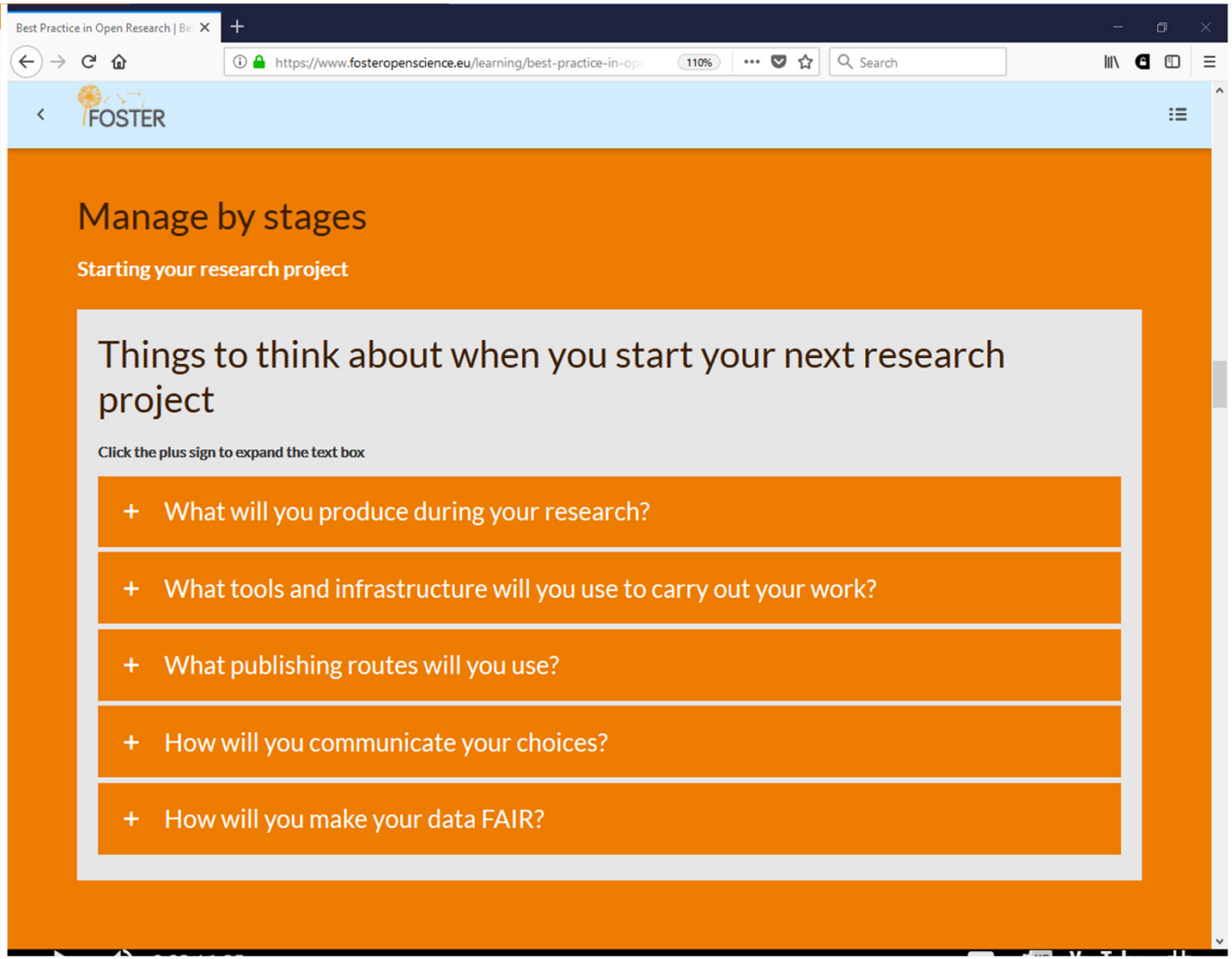
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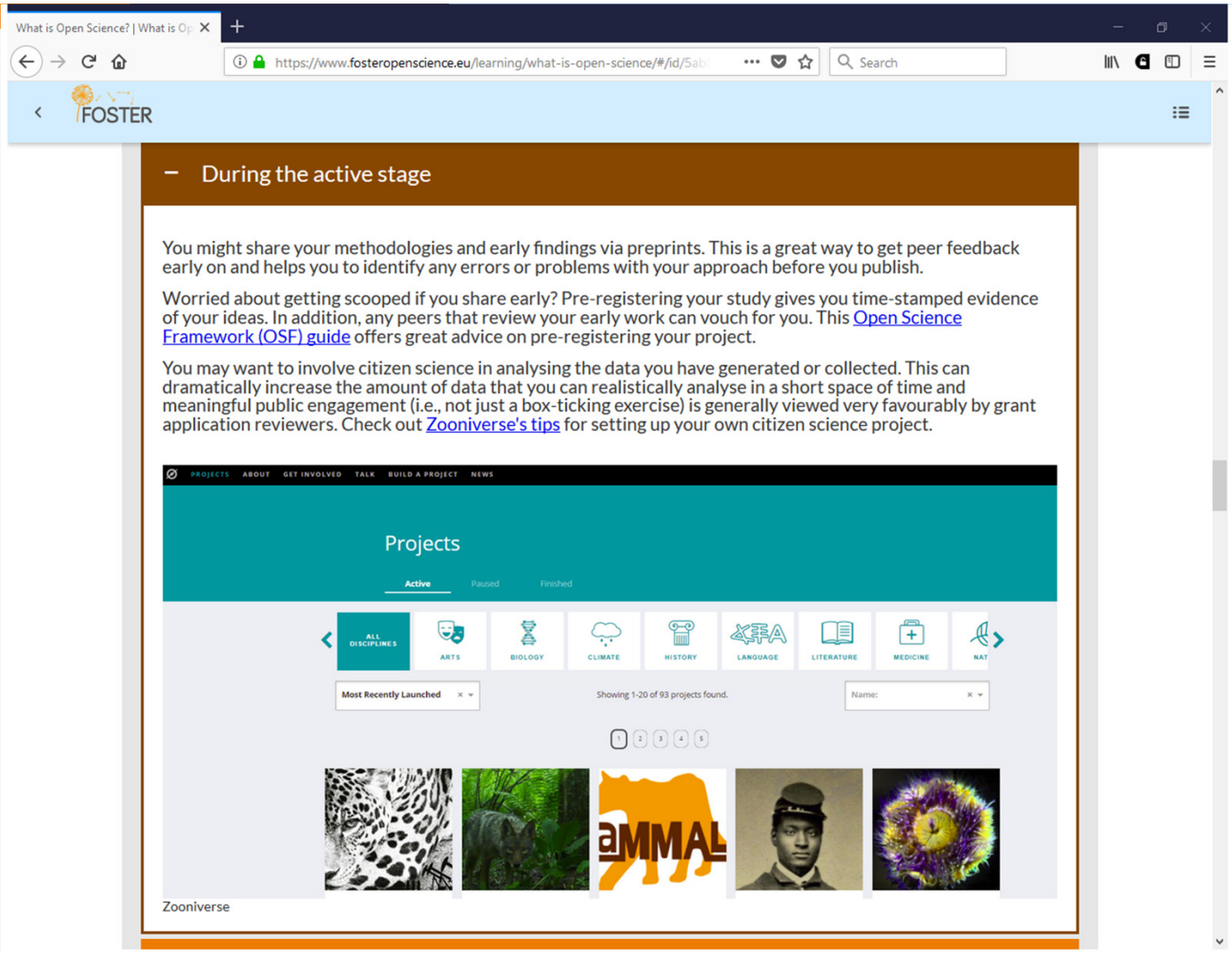
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You might share your methodologies and early findings via preprints. This is a great way to get peer feedback early on and helps you to identify any errors or problems with your approach before you publish.
Worried about getting scooped if you share early? Pre-registering your study gives you time-stamped evidence of your ideas. In addition, any peers that review your early work can vouch for you. This Open Science Framework (OSF) guide offers great advice on pre-registering your project.
You may want to involve citizen science in analysing the data you have generated or collected. This can dramatically increase the amount of data that you can realistically analyse in a short space of time and meaningful public engagement (i.e., not just a box-ticking exercise) is generally viewed very favourably by grant application reviewers. Check out Zooniverse's tips for setting up your own citizen science project.
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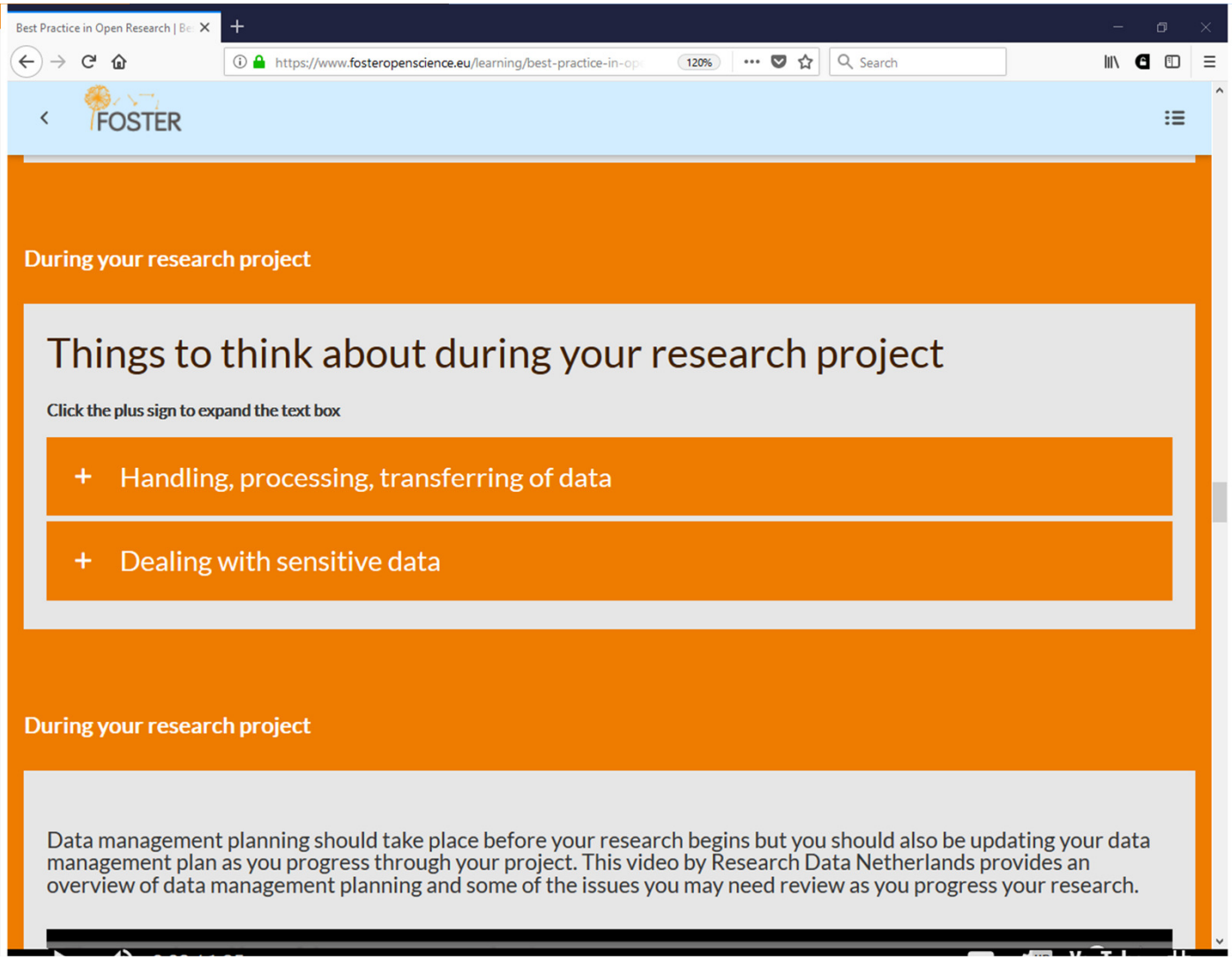
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During your research project
Things to think about during your research project
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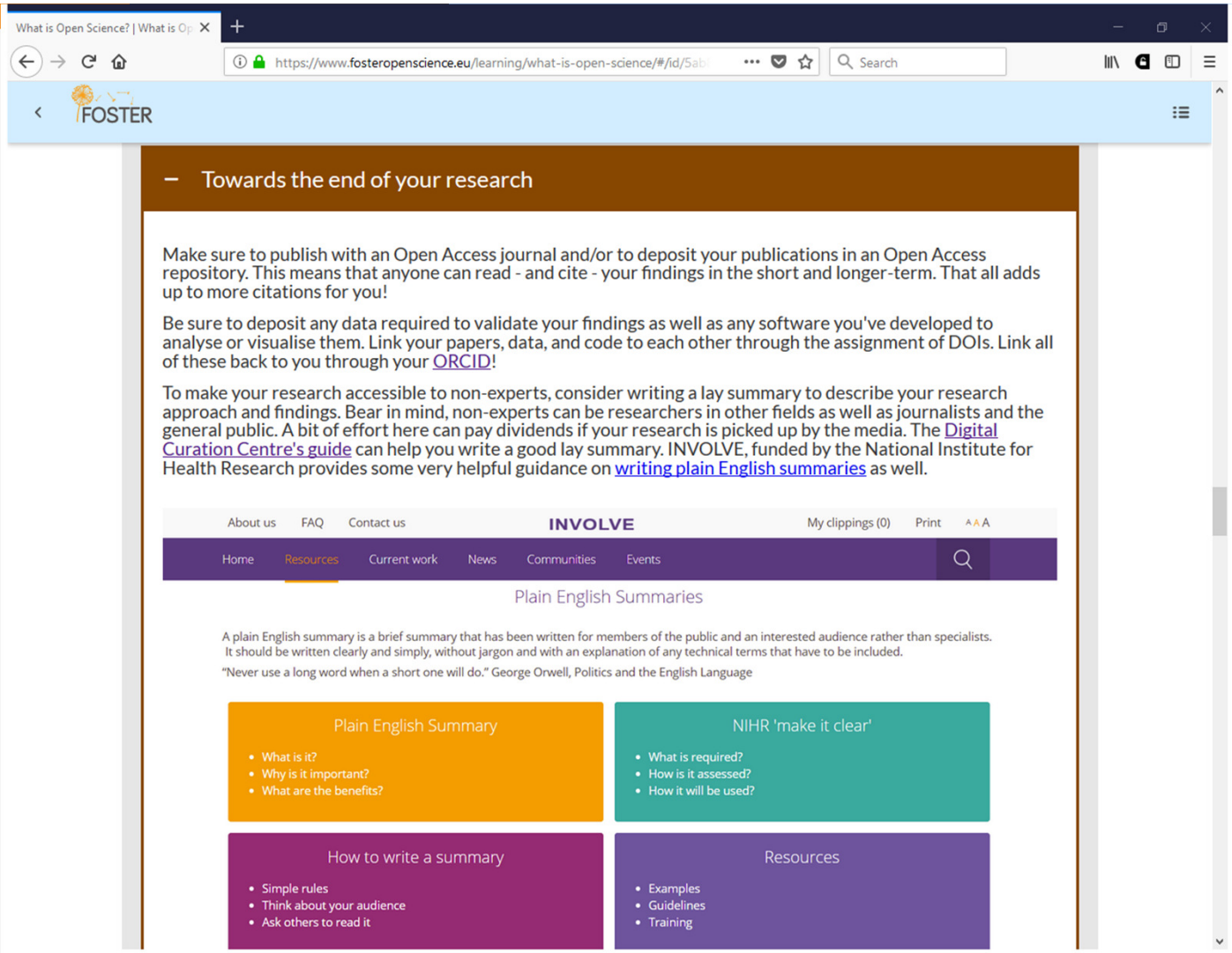
+ Handling, processing, transferring of data
+ Dealing with sensitive data
During your research project
Data management planning should take place before your research begins but you should also be updating your data management plan as you progress through your project. This video by Research Data Netherlands provides an overview of data management planning and some of the issues you may need review as you progress your research.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Towards the end of your research
Make sure to publish with an Open Access journal and/or to deposit your publications in an Open Access repository. This means that anyone can read - and cite - your findings in the short and longer-term. That all adds up to more citations for you!
Be sure to deposit any data required to validate your findings as well as any software you've developed to analyse or visualise them. Link your papers, data, and code to each other through the assignment of DOIs. Link all of these back to you through your ORCID!
To make your research accessible to non-experts, consider writing a lay summary to describe your research approach and findings. Bear in mind, non-experts can be researchers in other fields as well as journalists and the general public. A bit of effort here can pay dividends if your research is picked up by the media. The Digital Curation Centre's guide can help you write a good lay summary. INVOLVE, funded by the National Institute for Health Research provides some very helpful guidance on writing plain English summaries as well.
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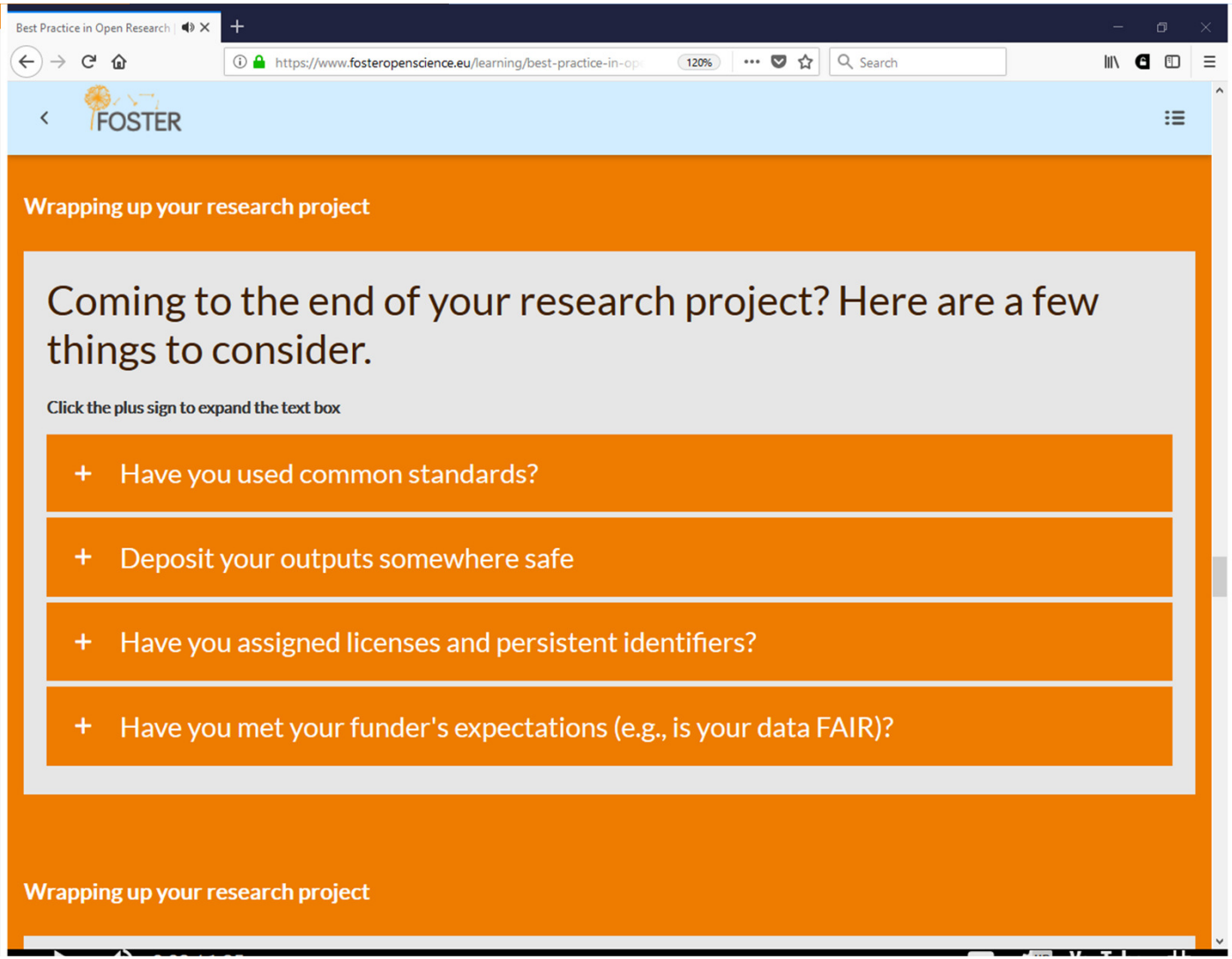
Plain English Summaries
A plain English summary is a brief summary that has been written for members of the public and an interested audience rather than specialists. It should be written clearly and simply, without jargon and with an explanation of any technical terms that have to be included.
"Never use a long word when a short one will do." George Orwell, Politics and the English Language
Plain English Summary
What is it?
Why is it important?
What are the benefits?
NIHR 'make it clear'
What is required?
How is it assessed?
How it will be used?
How to write a summary
Simple rules
Think about your audience
Ask others to read it
Resources
Examples
Guidelines
Training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Wrapping up your research project
Coming to the end of your research project? Here are a few things to consider.
Click the plus sign to expand the text box
+ Have you used common standards?
+ Deposit your outputs somewhere safe
+ Have you assigned licenses and persistent identifiers?
+ Have you met your funder's expectations (e.g., is your data FAIR)?
Wrapping up your research project

What does this mean for Horizon2020 applicants

Does #OpenScience matter at proposal evaluation

Based on: Winning Horizon 2020 with Open Science, http://dx.doi.org/10.5281/zenodo.12247

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www.fosteropenscience.eu

Winning Horizon2020 with Open Science?

Developed jointly between
FP7 FOSTER & FP7 OpenAIRE+
2015

DOI: 10.5281/zenodo.12247

Innovation Union & Europe 2020 Initiative

WHY Open Science in Horizon 2020?

Open Science (OS) offers researchers tools and workflows for transparency, reproducibility, dissemination and transfer of new knowledge. Ultimately, this can also have an impact on in research evaluation exercises, e.g. Research Excellence Framework (REF), set to demand greater "*societal impact*" in future, rather than just research output[1]. OS can also be an effective tool for research managers to transfer knowledge to society, and optimize the use and re-use by unforeseen collaborators. For funders, OS offers a better return on investment (ROI) for public funding, and underpins the EU Digital Agenda by measurably contributing to economic growth. This brief showcases why and how Open Science can optimize your Horizon 2020 proposal evaluation.

WHO is this "BRIEF" for?

This brief is developed through EC funding and specifically aimed at Horizon 2020 applicants and proposal writers seeking to comply with the Horizon 2020 Mandate (*Grant Agreement article 29.1-6*) and to optimize proposal evaluation and eventual societal impact of the resulting project.

HOW to use the "BRIEF"?

The text is **NOT** intended to be used verbatim as copy and paste contribution to your proposal. Instead, the brief presents suggested ways of formulating an impact section that answers the overarching political agendas and initiatives, as well as tips for ensuring that research results are effectively delivered to any users and the market place, across the various Horizon 2020 Pillars. The main text is generic, but some discipline-specific examples are included as examples, rather than covering all research fields. The footnotes also point to additional resources that will facilitate implementation to optimize project visibility and impact.

[1] Weighting of research impact confirmed for 2014 Research Excellence Framework http://www.hefce.ac.uk/news/newsarchive/2011/news62310.html , 2011

HOW to write "Section 2.2 IMPACT"

A generic example

The Project consortium acknowledges that the research and new knowledge generated is of societal benefit, and could potentially contribute toward solutions of societal challenges. As such, the foreground knowledge needs to be disseminated in an optimum way for impact and re-use of results, according to Responsible Research & Innovation (RRI) principles[14].

Currently only 50% of research is freely accessible to the public[15], resulting in measurable loss to the knowledge-based SME sector and slowing down innovation[16]. *The Project* consortium will thus optimize on the dissemination and impact of foreground along the full knowledge production chain, and integrate Open Science principles in its Dissemination & Communication Strategy.

In support of the EC Digital Agenda[17] and the Economic Growth agenda of the Innovation Union (Green Action Plan[18]), the consortium will fully integrate Grant Agreement Article 29 into its workflow at task level. Foreground data (*state diversity of data generated*) will be permanently archived at generation in *STATE REPOSITORY*[19] and publicly released and/or published[20] (*with the exception of Third Party data, national security data, medical/patient data*) during the lifetime of the project[21].

Software code, tools and interfaces developed as part of the concept will be open source code and full access provided via *STATE REPOSITORY*[22]. Resulting research publications (*refer to tasks/WP most likely to publish*) will also be made openly available via e-Infrastructure OpenAIRE[23] (DG CONNECT; *request letters of support*), predominantly relying on the Green Open Access strategy (self-archiving) for maximum return on investment for project and funder, and actively linked to underlying data objects, in support of the EC Open Data Pilot[24].

For longevity of knowledge transfer and best practice uptake beyond the project lifetime, *The Project* will cooperate with concurrent training initiatives within FP7 FOSTER[25] (DG Research) and OpenAIRE+, and incorporate Open Science training in any summers schools and research training workshops, to assure that the strategy is adopted by the next generation of young researchers (*refer to WP/Tasks dealing with this*).

Focus will be placed on demonstrating that Open Science and RRI are not only for societal and community benefit, but also directly support the career needs for impact, visibility and multiplying collaborations for individual researchers. Aiming the societal and research impact of knowledge generation can in the long-term bridge the gap between science and society.

[14] EC Responsible Research & Innovation http://ec.europa.eu/research/science-society/document_library/pdf_06/responsible-research-and-innovation-leaflet_en.pdf
[15] Archambault, E. *et al. 2013*. Proportion of OA Peer-Reviewed Papers at the European & World Levels 2004-2011 at http://www.science-metrix.com/pdf/SM_EC_OA_Availability_2004-2011.pdf
[16] Houghton, J., Swan, A., Brown, S., 2011. Access to research and technical information in Denmark [WWW Document]. URL http://www.deff.dk/uploads/media/Access_to_Research_and_Technical_Information_in_Denmark.pdf
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[18] EC Green Action Plan for SMEs http://ec.europa.eu/DocsRoom/documents/4790/attachments/1/translations/en/renditions/native
[19] Choose a discipline-specific perennial Data Repository from http://www.re3data.org/
[20] Choose likely Data Journals of relevance: e.g. Nature Scientific Data, or search http://doaj.org
[21] NB: embargoes can be placed to allow project to publish/exploit first, but consortium should aim for full release by end of contract, or justify why access needs to be restricted (publications may not be viewed favourably at review).
[22] Choose a structured archive with minimum metadata requirements to allow maximum re-use e.g. GitHub, SourceForge, etc.
[23] EC FP7 and Horizon2020 funded e-Infrastructure https://www.openaire.eu/ in support of EC Digital Agenda
[24] EC Open Data Pilot http://europa.eu/rapid/press-release_IP-13-1257_en.htm
[25] FP7 FOSTER, Facilitating Open Science in European Research (www.fosteropenscience.eu)

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Source: Winning Horizon 2020 with Open Science, http://dx.doi.org/10.5281/zenodo.12247

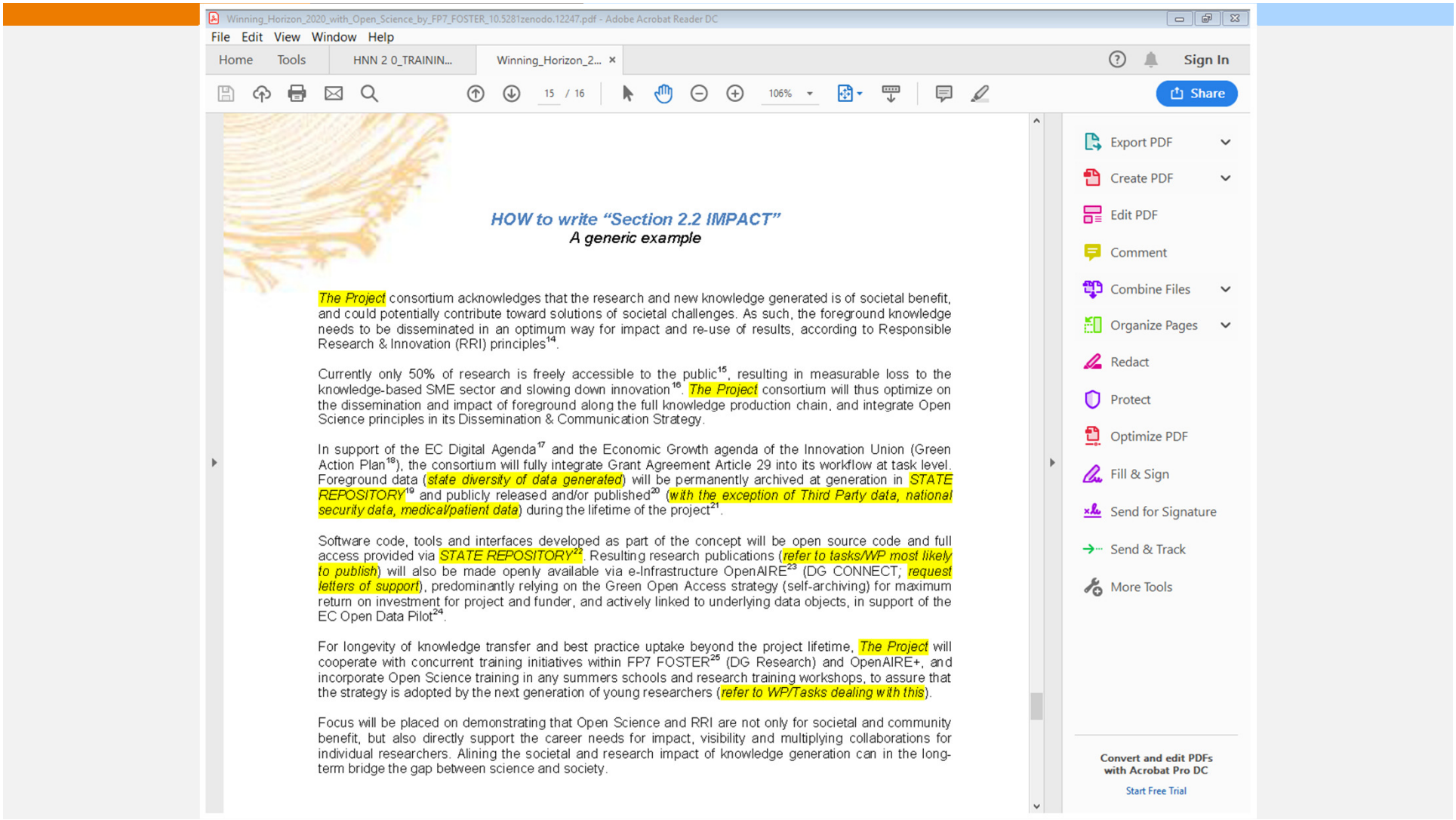
"…all parameters being equal, a proposal clearly integrating Open Science into its concept, contributing to EC's Digital Agenda and the Innovation Union's objectives, will inherently be favoured by aware project officer/evaluator teams, over same score proposals. Supporting the principles your funders believe in, adds to the competitiveness of your proposal, even when this is not explicitly formulated in the evaluation criteria. Ultimately, a good research idea must not fail due to a lack of sufficient detail regarding openness, dissemination and broader use of the new knowledge beyond academia."


Winning Horizon2020
with
Open Science?

"Applicants should be clear about the research outputs they anticipate producing during the life of the project along with a detailed account of how these will be stored and shared over time. Applicants should aim to provide optimum, traceable and perennial access to selected research products of the project, from ***research data***, ***software code***, ***publications***, ***educational resources***, ***reports***, ***policy briefs*** etc., that can help accelerate transfer of new knowledge from academia to society, as well as improve reproducibility of public-funded research. As a minimum, applicants should retain any and all outputs that are required to verify the published research findings."

“Open science can contribute positively throughout your proposal structure, from your attitude and mind-set when developing the concept (Section 1), to impact & dissemination (Section 2), to the actual implementation of individual workpackages and tasks.

For ease of implementation, and potentially a stronger evaluation, consider open science as part of performing transparent, rigorous and reproducible research, as described in your proposal concept.



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Excellence

Impact

"Weakness: highly focused on academic activities, and lacks an advanced communication strategy"

"data accessibility is unclear!"

"Open Access to scientific knowledge is an essential principle in the project, but there is not enough information on data management or IPR."

Implementation

"data storage & access not considered"

Impact:

"Strengths: extensive dissemination of data to the scientific community (open access, databases)"

"outreach activities to a broad audience"

"research software is freely available"

Impact:

Societal Challenge 2, Food:

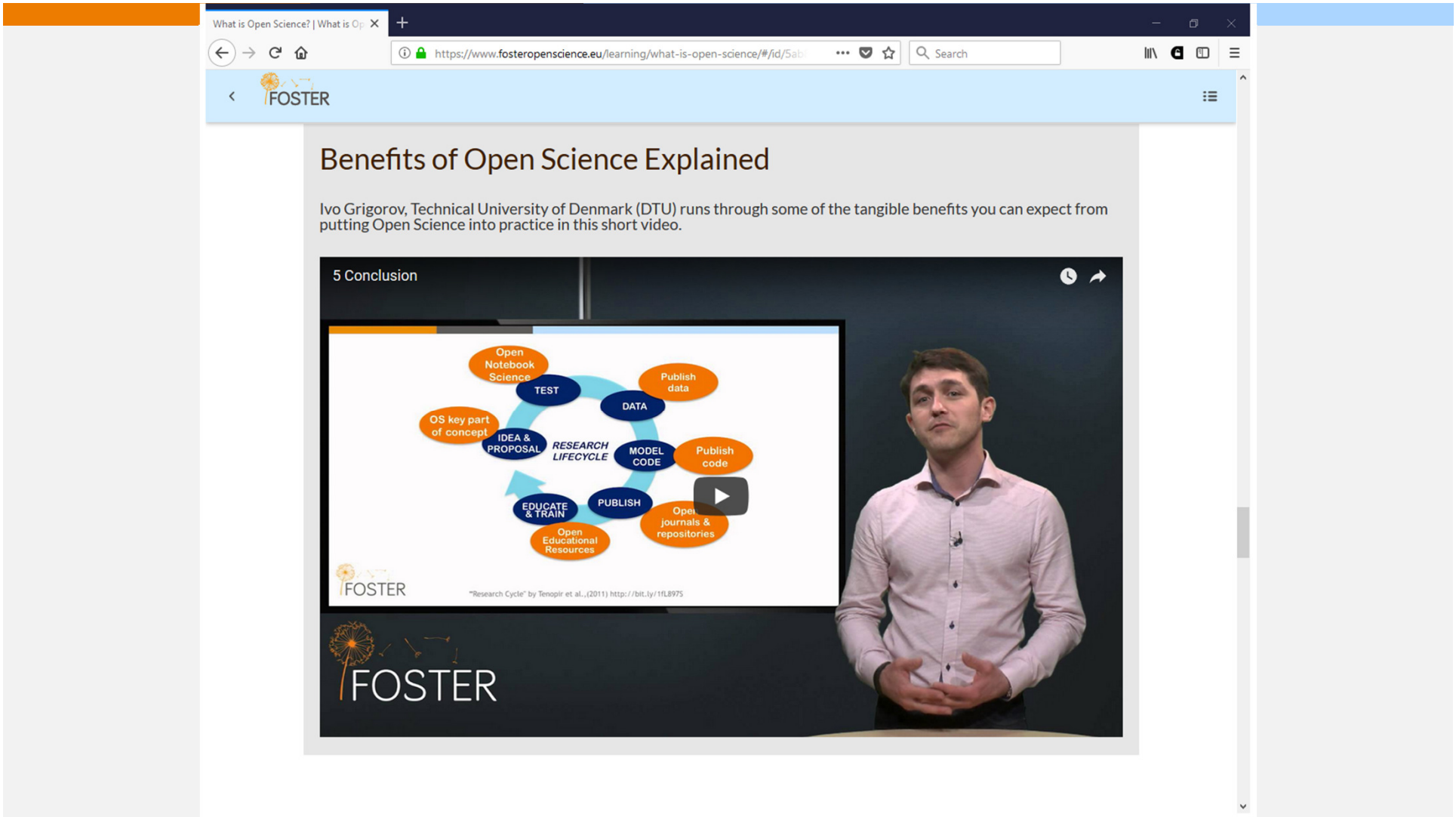
"new knowledge delivered to SMEs by depositing research outputs in OpenAIRE2020 and EMODNet"

" Data management is based on INSPIRE Directive that will favour open access for environmental data and open publications"

"web-based decision support system (with open code) to make it available to a wide, but targeted audience"

Societal Challenge 5, Climate:

"The communication plan is very effective. Training for communication and open access procedures are especially welcome."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Benefits of Open Science Explained
Ivo Grigorov, Technical University of Denmark (DTU) runs through some of the tangible benefits you can expect from putting Open Science into practice in this short video.
5 Conclusion
Open Notebook Science
TEST
DATA
Publish data
OS key part of concept
IDEA & PROPOSAL
RESEARCH LIFECYCLE
MODEL CODE
Publish code
EDUCATE & TRAIN
PUBLISH
Open journals & repositories
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"Research Cycle" by Tenopir et al.,(2011) http://bit.ly/1fL8975
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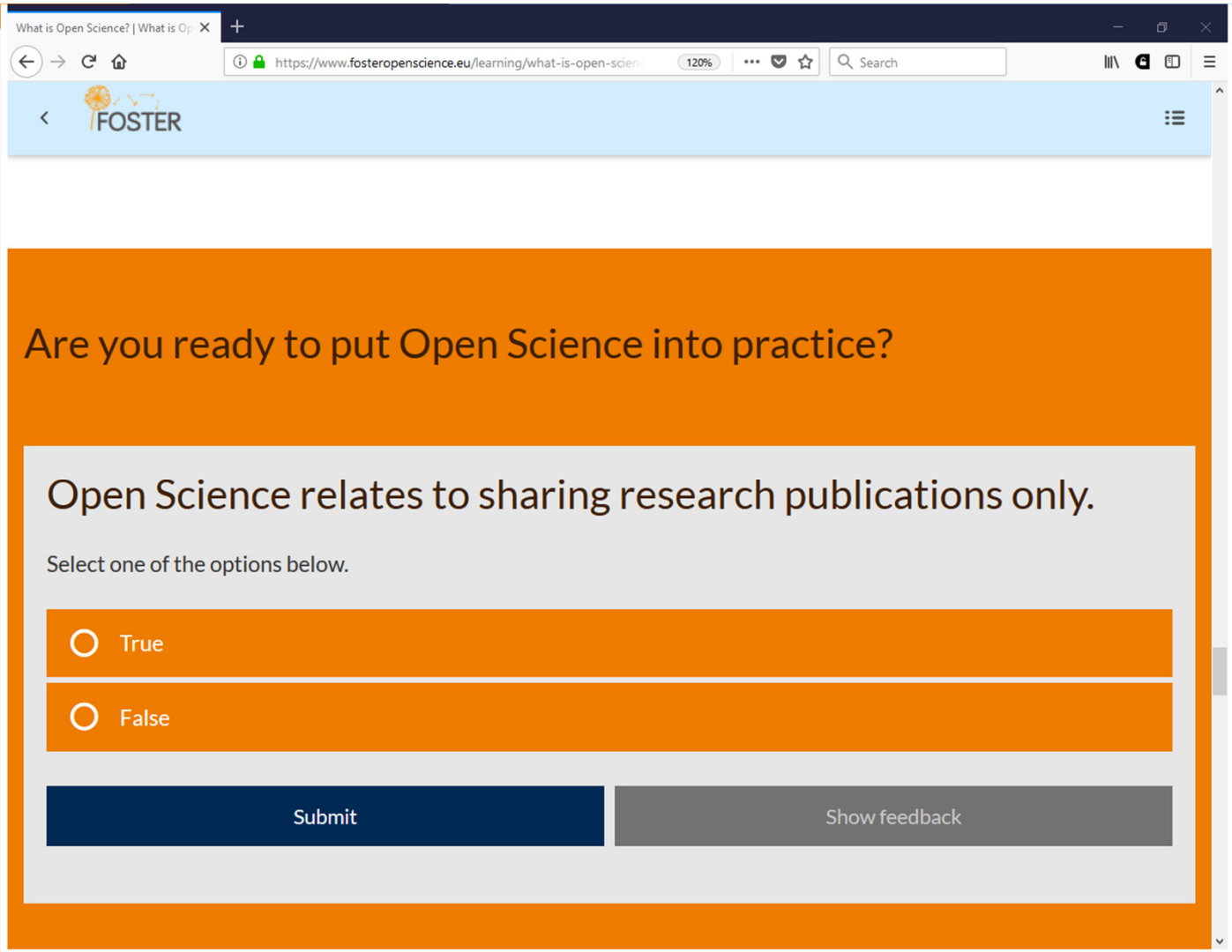
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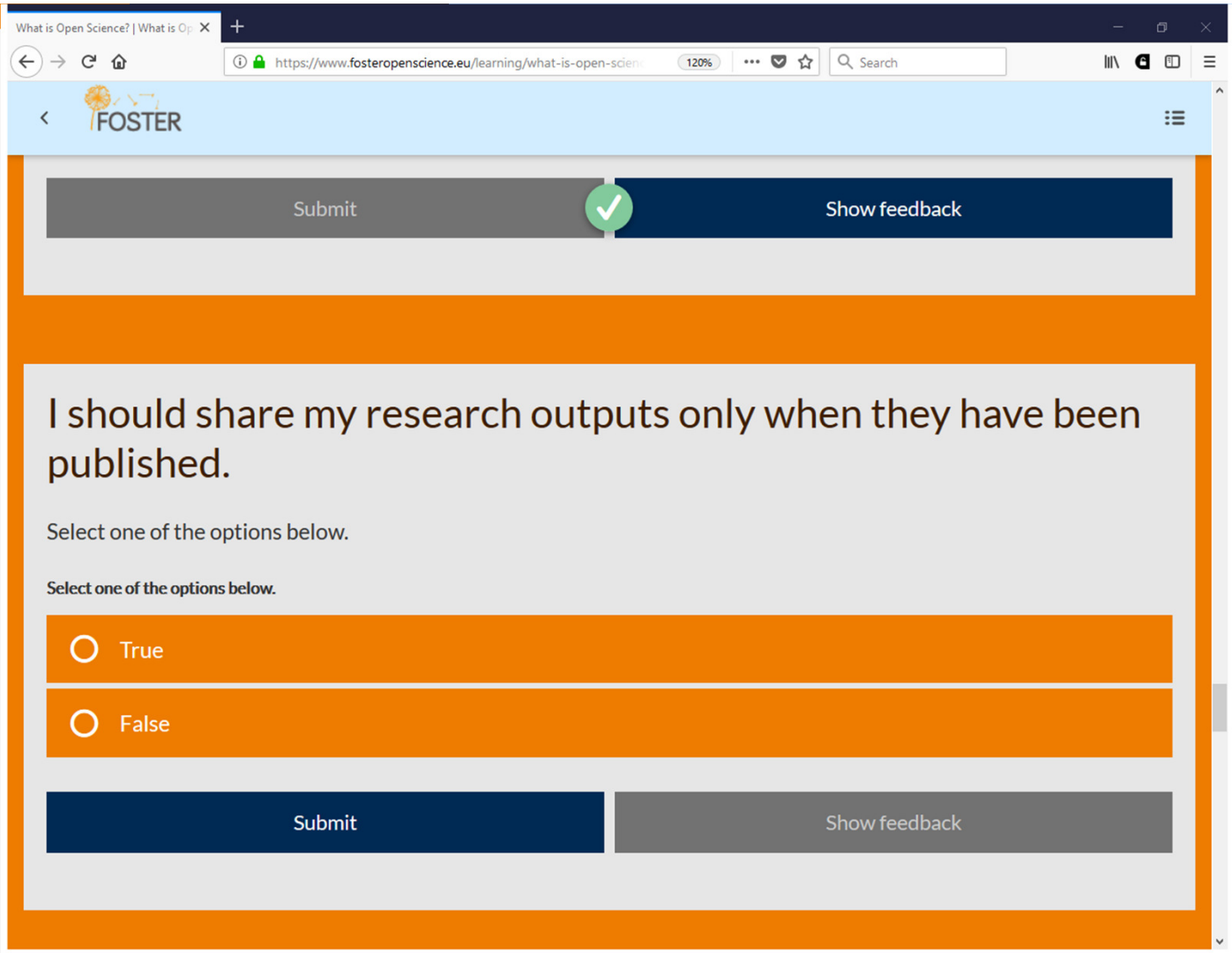
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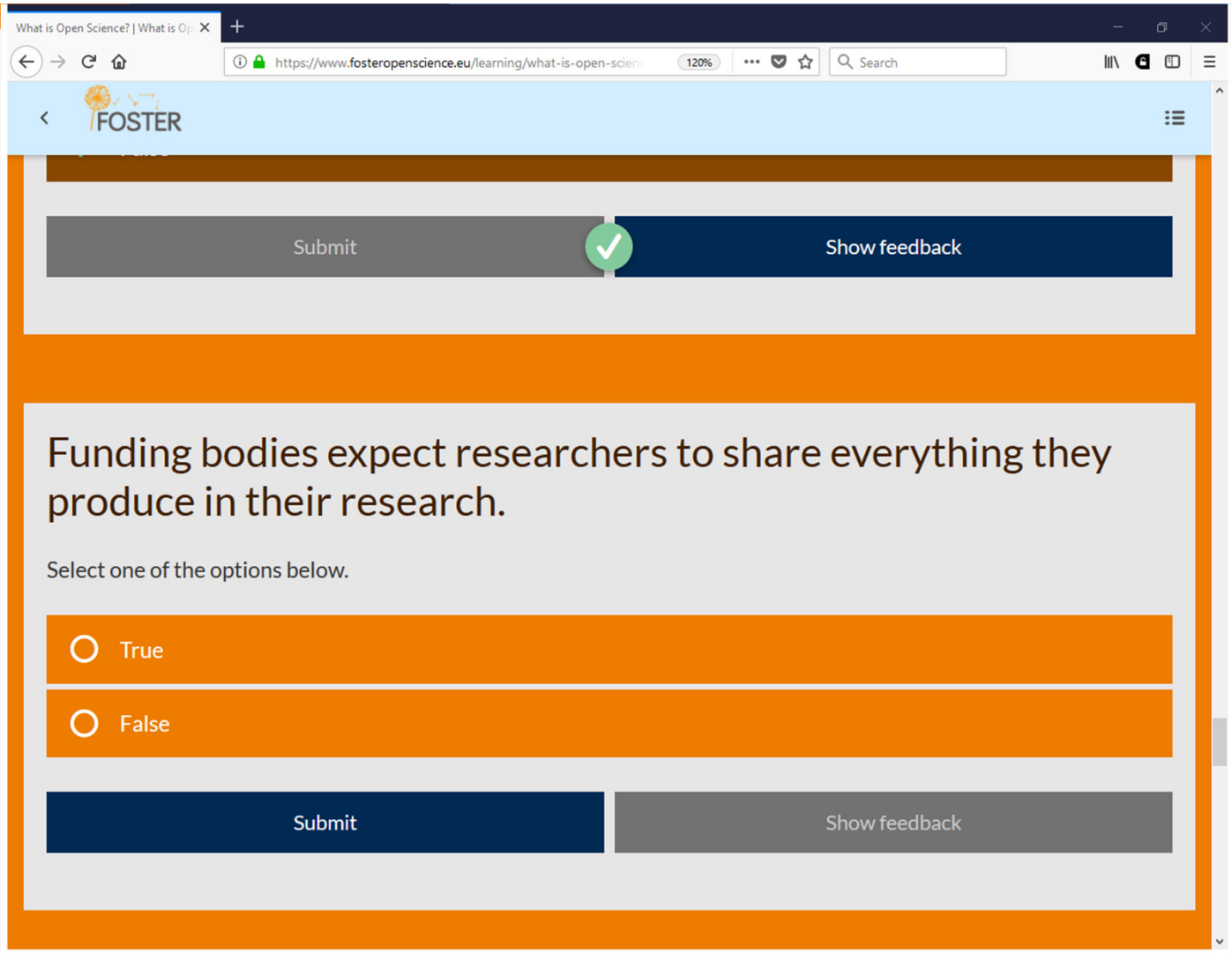
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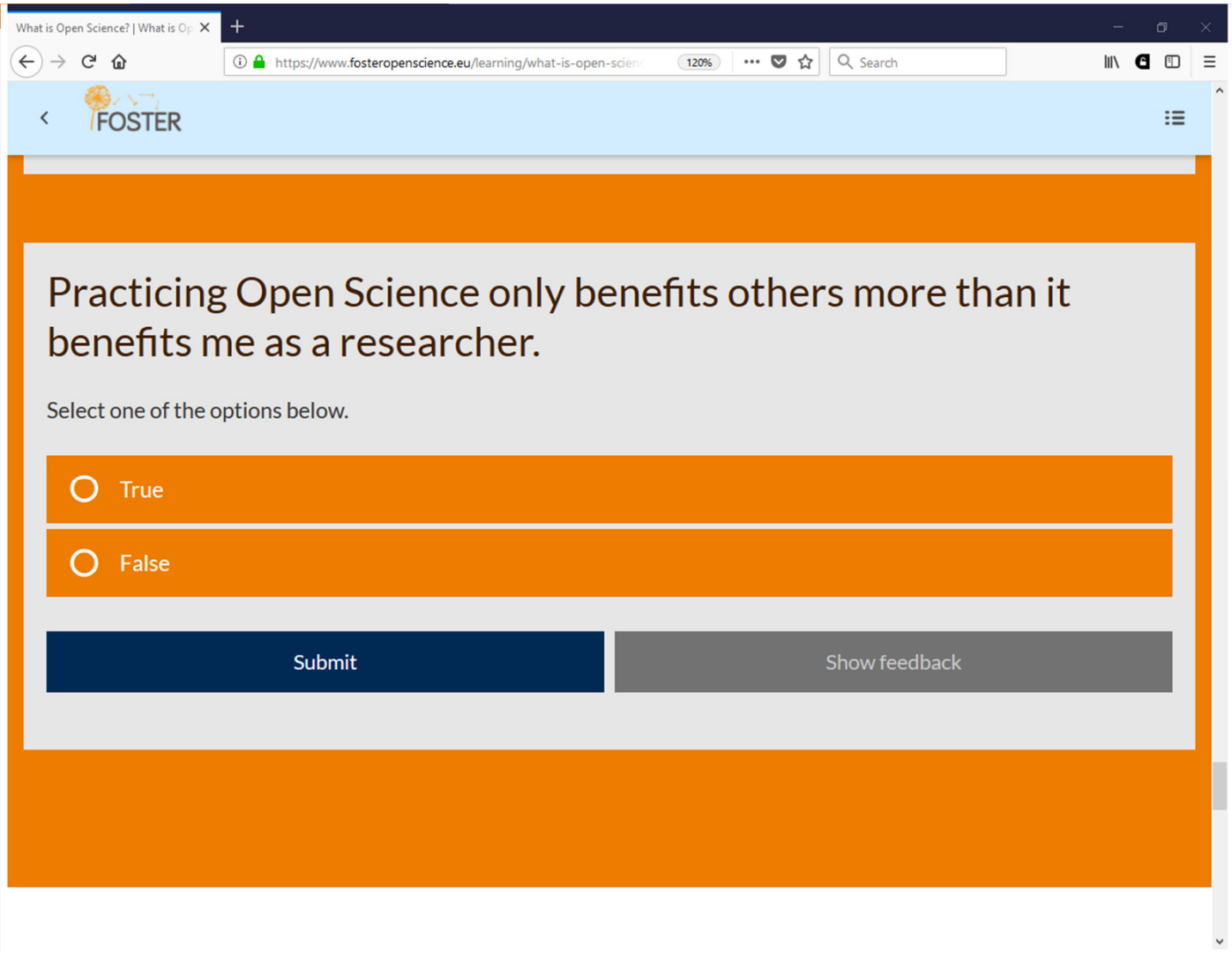
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Interesting website regarding Open Data: https://www.openaire.eu/ with interesting factsheets: https://www.openaire.eu/openaire-h2020-factsheets

Contacts in Belgian of the OpenAire projects are:

Inge Van Nieuwerburgh: https://www.openaire.eu/72-noads/47-inge-van-nieuwerburgh and

Emilie Hermans: https://www.openaire.eu/72-noads/129