ETH zürich

IT Services

Supporting the reproducible research value chain in bioinformatics: from raw data to final publication

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Scientific IT Services, ETH Zurich

SIB Days, 24.06.2024

Open Science and Open Research Data

Open Research Data

❗ Requirement from funding agencies, journals, academic institutions

FAIR data

Look at all of this data! Tons of it!
Yes, but what does it all mean? Too much of a good thing isn't always a good thing. Data without meaning... is just data.
Copyright © MMXV Shep Hyken.
FAIR DATA PRINCIPLES
AH!
FINDABLE
ACCESSIBLE
DO YOU
A .X39 FILE?
INTEROPERABLE
HERE
REUSABLE

Persistent Identifier; metadata

Open protocol

Data format

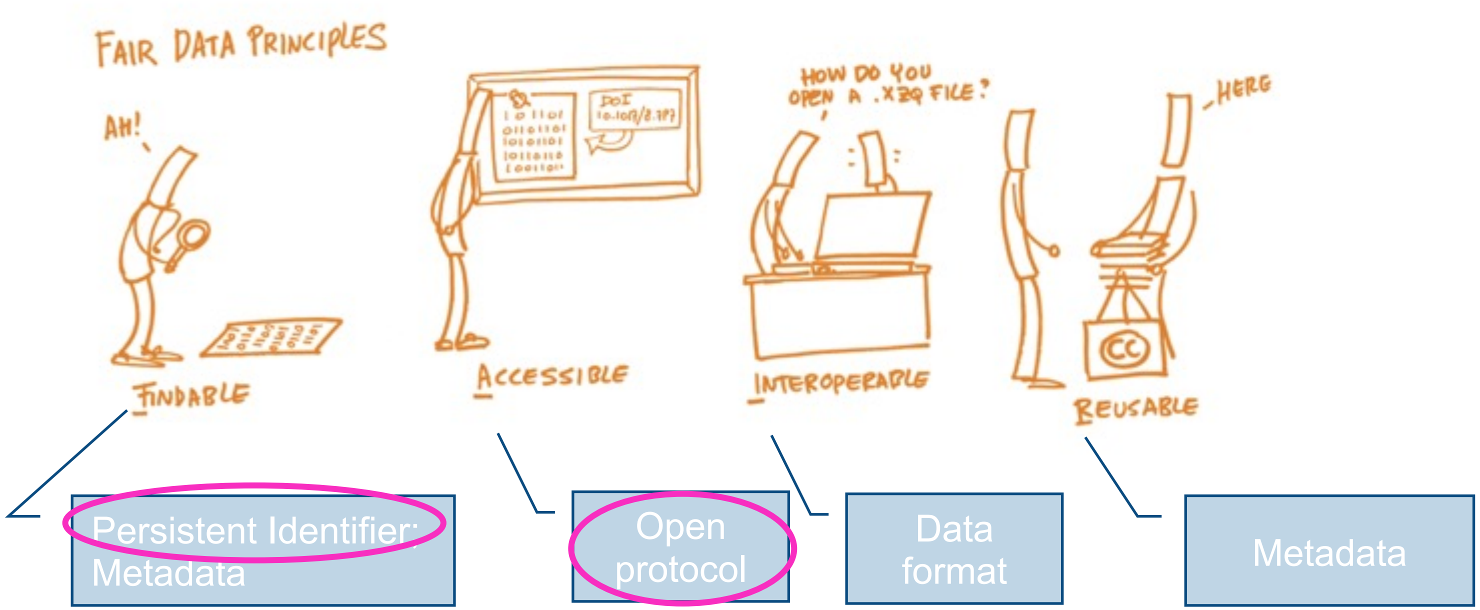
Metadata

The FAIR Data Principles

F	F1. (Meta)data are assigned a **globally unique** and **persistent identifie**r. F2. Data are described with **rich metadata** (defined by R1 below). F3. Metadata clearly and explicitly include the identifier of the data they describe. F4. (Meta)data are registered or indexed in a searchable resource.
A	A1. (Meta)data are retrievable by their identifier using a **standardised communications protocol**. A1.1 The **protocol is open, free, and universally implementable**. A1.2 The protocol allows for an authentication and authorisation procedure, where necessary. A2. **Metadata are accessible**, even when the data are no longer available
I	I1. (Meta)data use a **formal, accessible, shared, and broadly applicable language for knowledge representation**. I2. (Meta)data use **vocabularies** that follow FAIR principles. I3. (Meta)data include qualified references to other (meta)data
R	R1. (Meta)data are richly described with a plurality of **accurate** and **relevant attributes**. R1.1. (Meta)data are released with a clear and accessible data usage license. R1.2. (Meta)data are associated with detailed provenance. R1.3. (Meta)data meet domain-relevant community standards

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

Prepare to meet the FAIR requirements when data are generated



Persistent Identifier; Metadata

Open protocol

Data format

Metadata

When data are **published**

How can we share data in a FAIR way?

A few generic data repositories recommended by SNSF

ETH zürich
Research Collection

OLOS

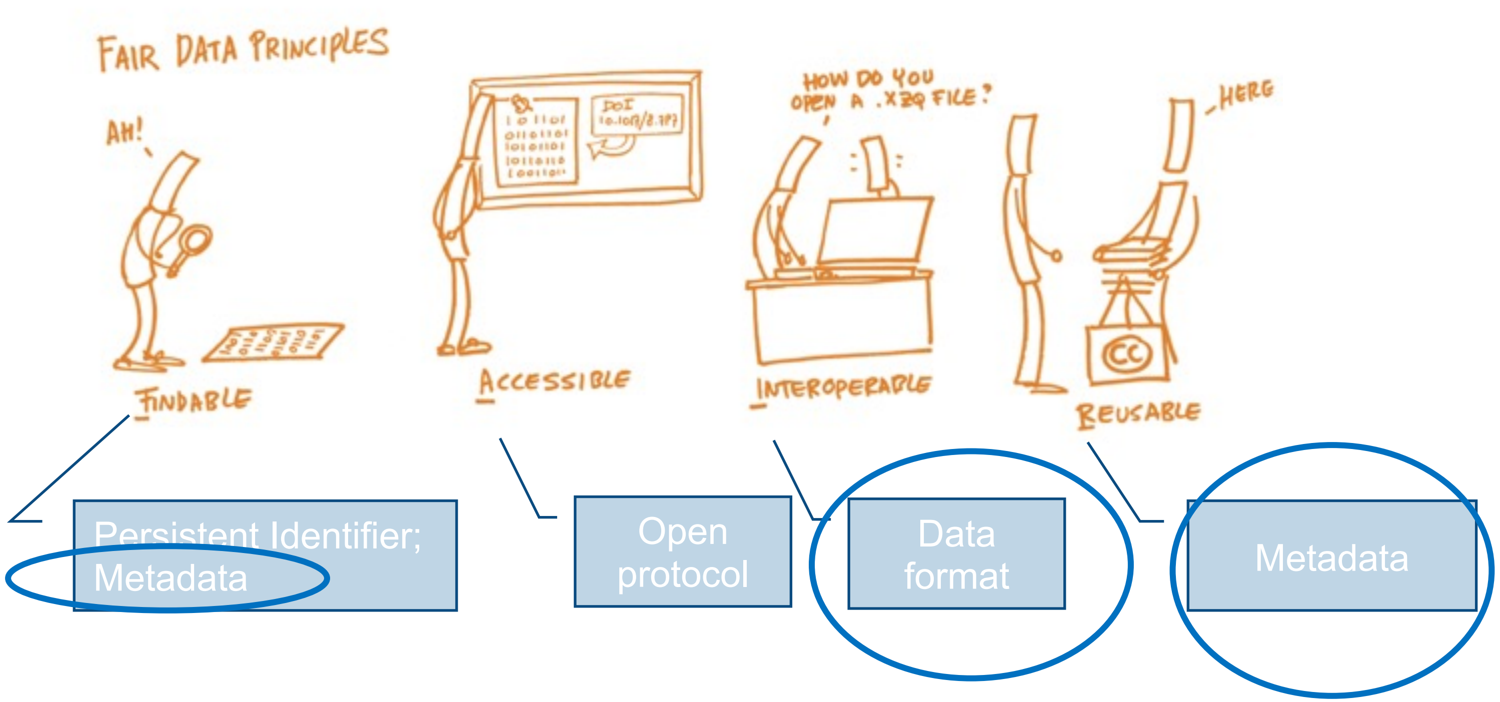
OSF

DRYAD

zenodo

re3data.org
REGISTRY OF RESEARCH DATA REPOSITORIES

Prepare to meet the FAIR requirements when data are generated



Persistent Identifier; Metadata

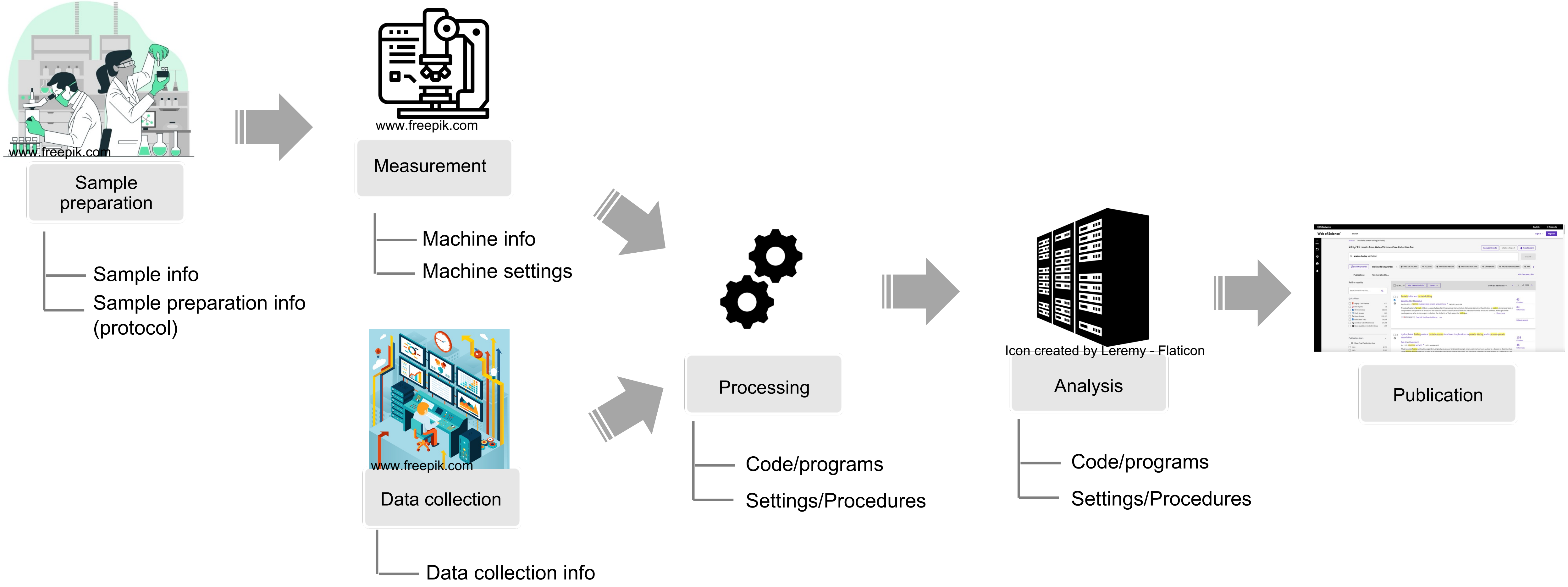
Open protocol

Data format

Metadata

When data are **generated**

Data and information generation during a research project



www.freepik.com

Sample preparation

- Sample info
- Sample preparation info (protocol)

www.freepik.com

Measurement

- Machine info
- Machine settings

www.freepik.com

Data collection

- Data collection info

Processing

- Code/programs
- Settings/Procedures

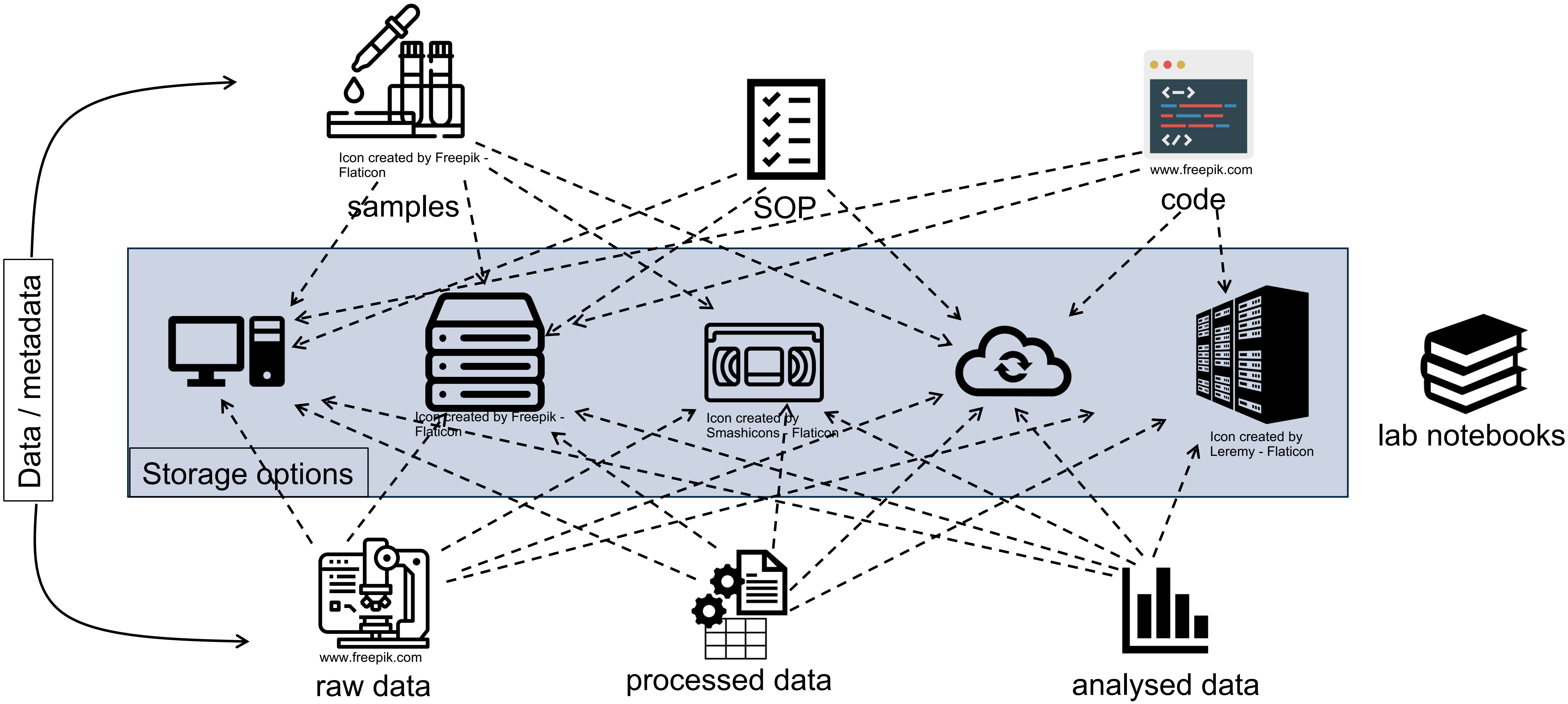
Icon created by Leremy - Flaticon

Analysis

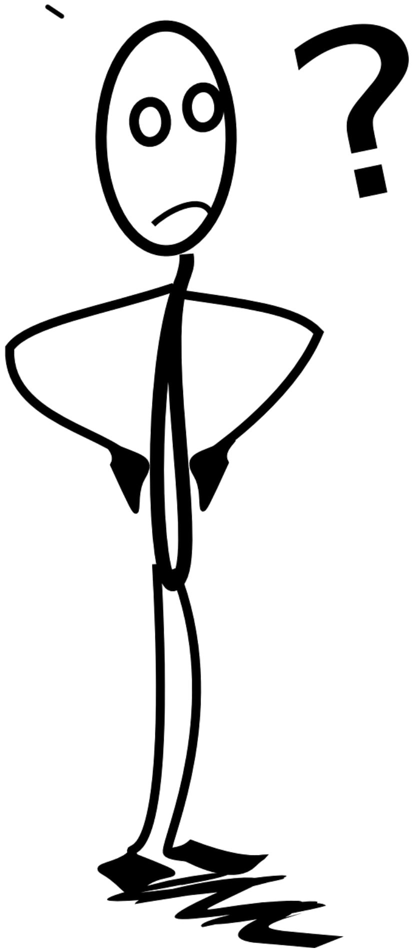
- Code/programs
- Settings/Procedures

Publication

The “Data Spread”: a Common Scenario in Academic Research


Icon created by Freepik - Flaticon
samples
SOP
www.freepik.com
code
Data / metadata
Icon created by Freepik - Flaticon
Icon created by Smashicons - Flaticon
Icon created by Leremy - Flaticon
lab notebooks
Storage options
www.freepik.com
raw data
processed data
analysed data

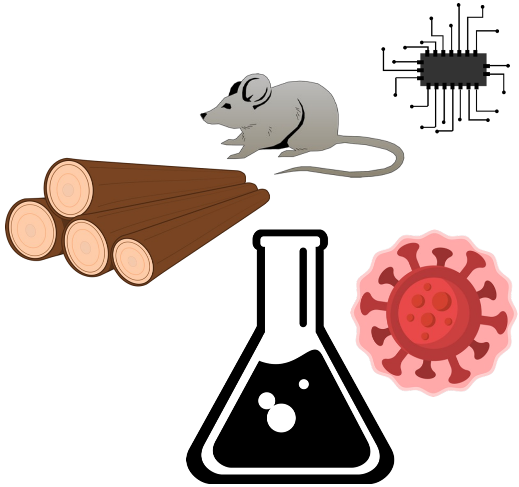
Which tools can we use to manage all these data and information?



RDM

Research Data Management

Management of materials and samples



Spreadsheets / tabular files

Not scalable

No sharing

No efficient search

Easy to use

Database/ LIMS

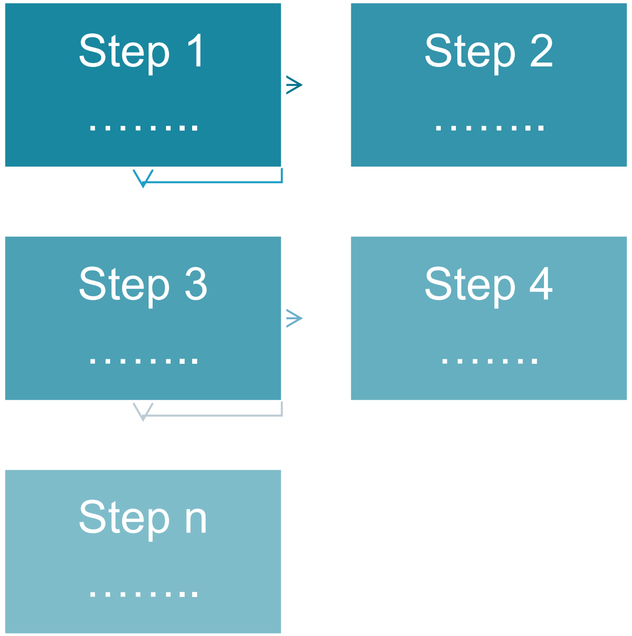
+Scalable

+ Sharing

+ Search functionality

- Require time for set up and maintenance

Management of protocols



Step 1
……..

Step 2
……..

Step 3
……..

Step 4
…….

Step n
……..

Text files

Not scalable
No sharing
No efficient search
Easy to use

WIKI

Scalable
Sharing
Search functionality
Versioning

Database/ LIMS

Scalable
Sharing
Search functionality
Require time for set up and maintenance

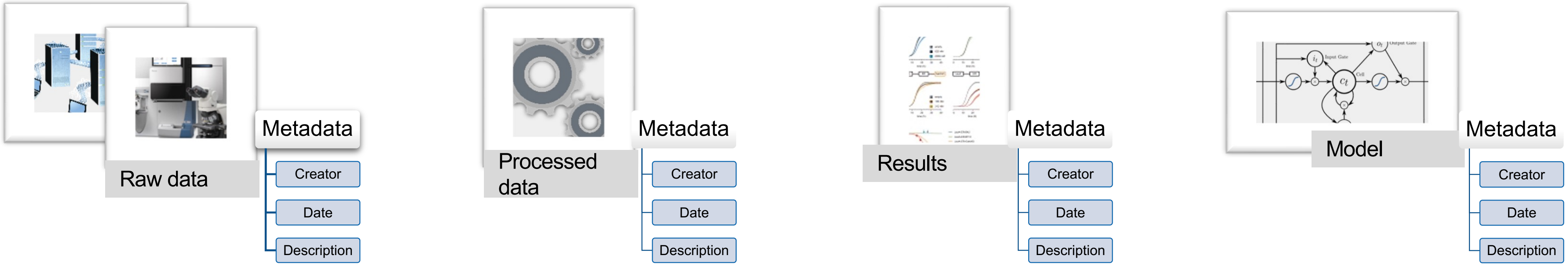
Laboratory Information Management System (LIMS)

illumina
ThermoFisher SCIENTIFIC
LabKey
openBIS
LABWARE LIMS Solutions
BIOVIA

- ❑ LIMS are software for managing laboratory operations:
  - **sample tracking**
  - **sample data tracking**
  - **protocol management**

- ❑ Nowadays **LIMS are often combined with ELNs** in one platform.

Management of research data files

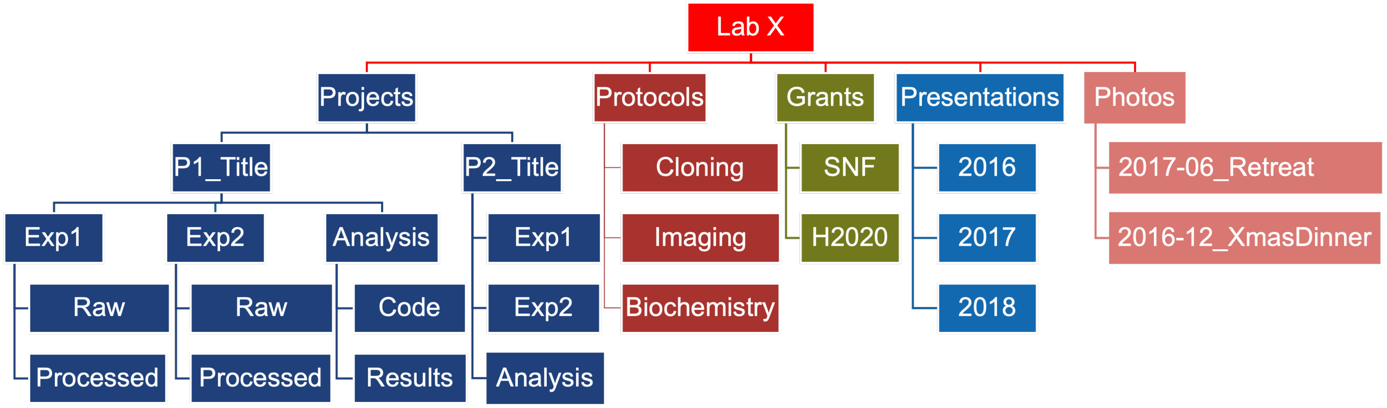


Raw data
Metadata
- Creator
- Date
- Description

Processed data
Metadata
- Creator
- Date
- Description

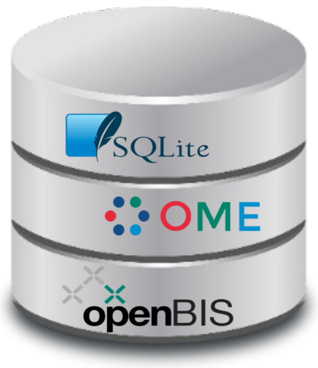
Results
Metadata
- Creator
- Date
- Description

Model
Metadata
- Creator
- Date
- Description



- Lab X
  - Projects
    - P1_Title
      - Exp1
        - Raw
        - Processed
      - Exp2
        - Raw
        - Processed
      - Analysis
        - Code
        - Results
    - P2_Title
      - Exp1
      - Exp2
      - Analysis
  - Protocols
    - Cloning
    - Imaging
    - Biochemistry
  - Grants
    - SNF
    - H2020
  - Presentations
    - 2016
    - 2017
    - 2018
  - Photos
    - 2017-06_Retreat
    - 2016-12_XmasDinner

Files / folders hierarchy



Data management platform

Data management platforms

Generic

PostgreSQL

FileMaker
An Apple Subsidiary

SQLite

Microsoft Access

Scientific

PostGIS
Spatial PostgreSQL

openBIS

SLIMS
Agilent Technologies

rasdaman
raster data manager

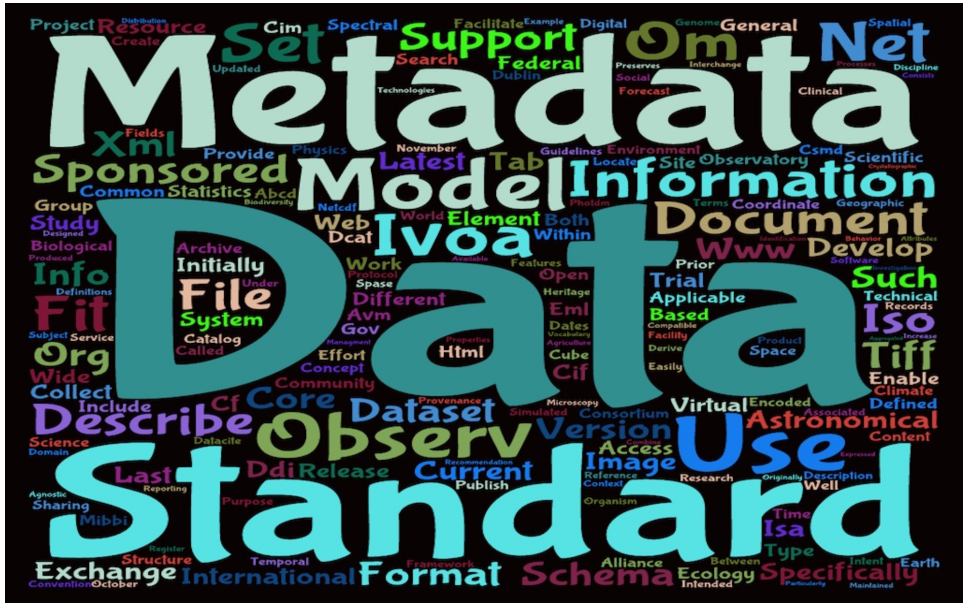
OME

RSpace

- System that allows **structured organization** of data
- Data are described by **metadata**
- Usually more FAIR-compliant than Files / Folders
- Searchable, scalable, flexible
- Allows user rights management

Metadata

- **Metadata** is the *data about your data*
- (Machine-readable) **Metadata** is a key element of the **FAIR data** principles
- Use of structured metadata **facilitates data organization** and searches
- Existing **metadata schemas** are preferred (can be extended, if necessary)



https://rdamsc.bath.ac.uk/

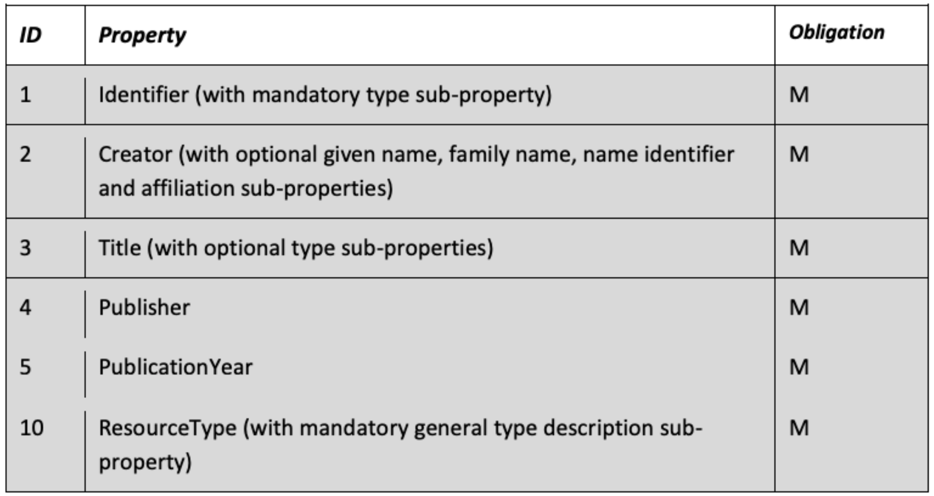
Metadata schema

- ❑ Defines the structure for the metadata.
- ❑ Schema defined by a scientific community to enable the best description of a resource type for their needs.
- ❑ **Generic metadata** schema examples:

DublinCore

DataCite

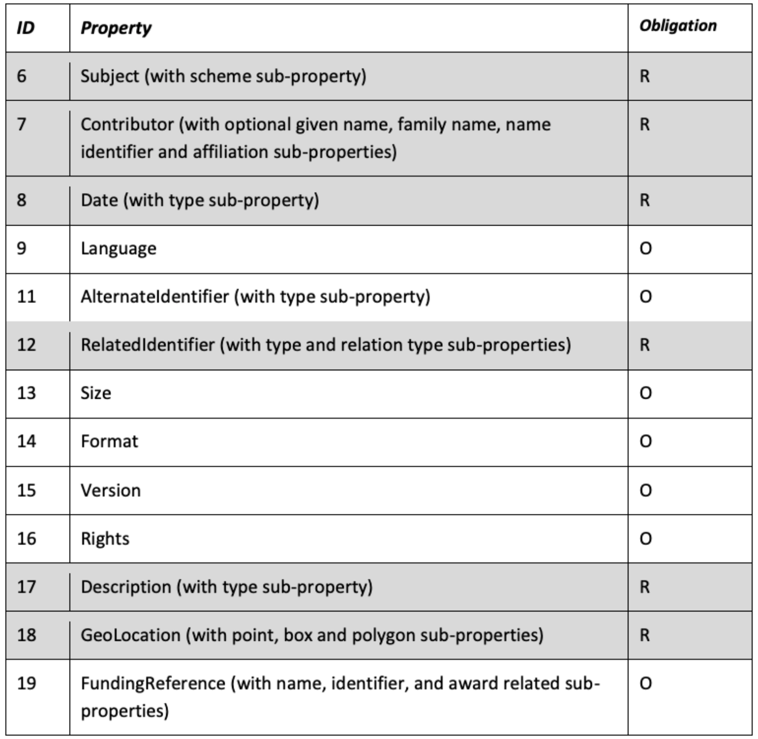
Table 1: DataCite Mandatory Properties



ID	*Property*	*Obligation*
1	Identifier (with mandatory type sub-property)	M
2	Creator (with optional given name, family name, name identifier and affiliation sub-properties)	M
3	Title (with optional type sub-properties)	M
4	Publisher	M
5	PublicationYear	M
10	ResourceType (with mandatory general type description sub-property)	M

https://schema.datacite.org/

Table 2: DataCite Recommended and Optional Properties



ID	*Property*	*Obligation*
6	Subject (with scheme sub-property)	R
7	Contributor (with optional given name, family name, name identifier and affiliation sub-properties)	R
8	Date (with type sub-property)	R
9	Language	O
11	AlternateIdentifier (with type sub-property)	O
12	RelatedIdentifier (with type and relation type sub-properties)	R
13	Size	O
14	Format	O
15	Version	O
16	Rights	O
17	Description (with type sub-property)	R
18	GeoLocation (with point, box and polygon sub-properties)	R
19	FundingReference (with name, identifier, and award related sub-properties)	O

Metadata schema

- ❑ Defines the structure for the metadata.
- ❑ Schema defined by a scientific community to enable the best description of a resource type for their needs.
- ❑ **Discipline-specific** metadata schema examples:

OME

Microscopy images

DDI

Social Sciences

EML

Ecology

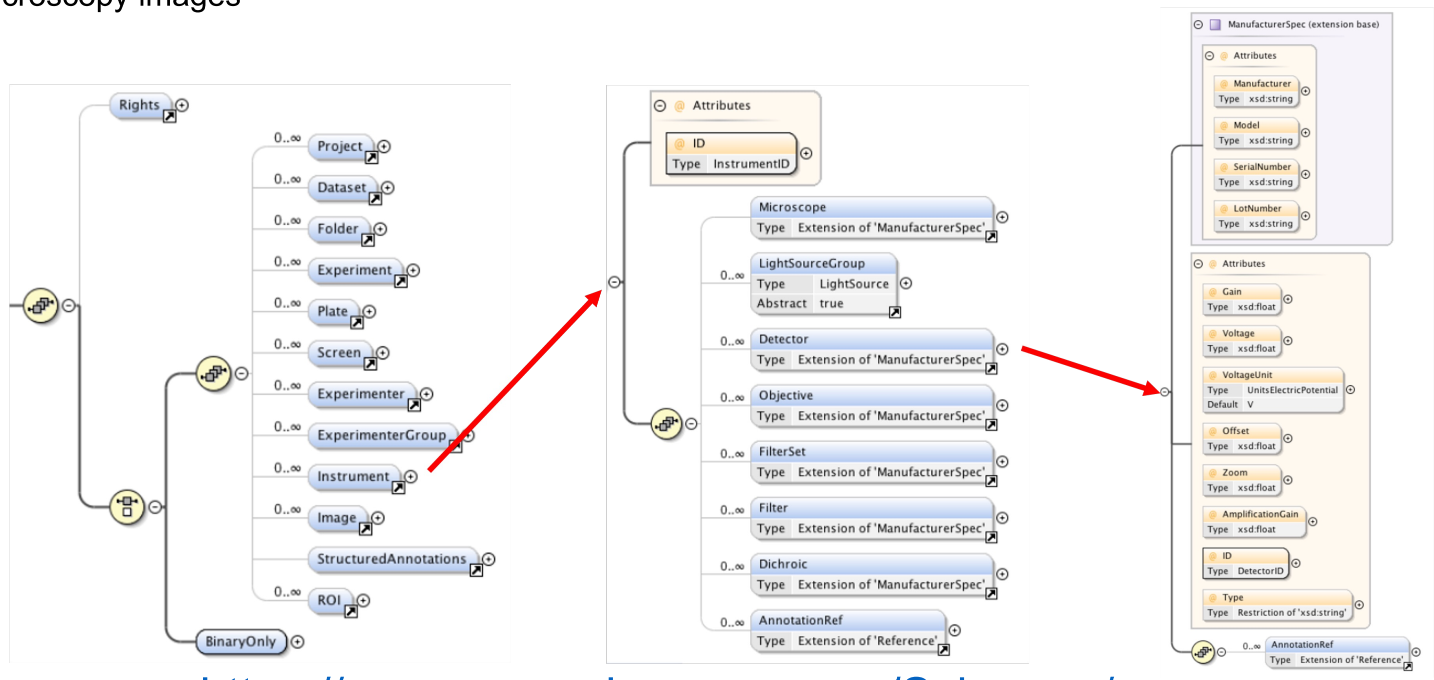
Biodiversity Information Standards TDWG

Biology

SPHN Swiss Personalized Health Network

SPHN Meta-Data Catalogue

Health data

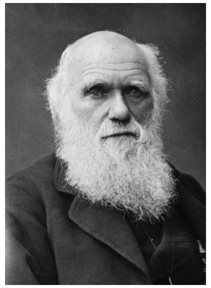


Rights
0..∞ Project
0..∞ Dataset
0..∞ Folder
0..∞ Experiment
0..∞ Plate
0..∞ Screen
0..∞ Experimenter
0..∞ ExperimenterGroup
0..∞ Instrument
0..∞ Image
StructuredAnnotations
0..∞ ROI
BinaryOnly
Attributes
ID Type InstrumentID
Microscope Type Extension of 'ManufacturerSpec'
0..∞ LightSourceGroup Type LightSource Abstract true
0..∞ Detector Type Extension of 'ManufacturerSpec'
0..∞ Objective Type Extension of 'ManufacturerSpec'
0..∞ FilterSet Type Extension of 'ManufacturerSpec'
0..∞ Filter Type Extension of 'ManufacturerSpec'
0..∞ Dichroic Type Extension of 'ManufacturerSpec'
0..∞ AnnotationRef Type Extension of 'Reference'
ManufacturerSpec (extension base)
Attributes
Manufacturer Type xsd:string
Model Type xsd:string
SerialNumber Type xsd:string
LotNumber Type xsd:string
Attributes
Gain Type xsd:float
Voltage Type xsd:float
VoltageUnit Type UnitsElectricPotential Default V
Offset Type xsd:float
Zoom Type xsd:float
AmplificationGain Type xsd:float
ID Type DetectorID
Type Type Restriction of 'xsd:string'
0..∞ AnnotationRef Type Extension of 'Reference'

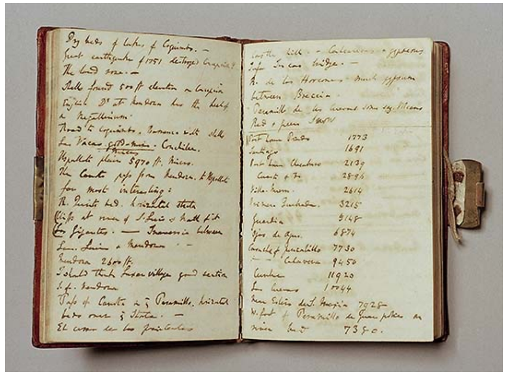
https://www.openmicroscopy.org/Schemas/

Electronic Laboratory Notebooks

- ❑ Scientists have always documented their findings in paper notebooks.

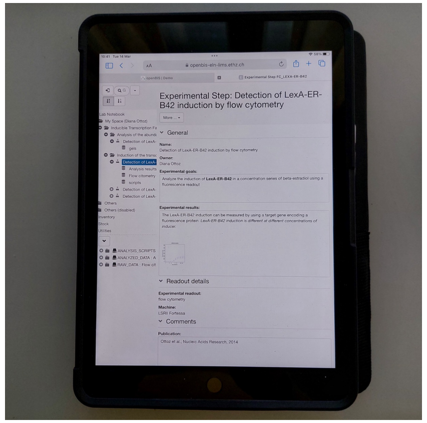


C. Darwin



Beagle voyage notebooks

1831-1836



Experimental Step: Detection of LexA-ER-B42 induction by flow cytometry

General

Name:
Detection of LexA-ER-B42 induction by flow cytometry

Owner:
Diana Ottoz

Experimental goals:
Analyze the induction of **LexA-ER-B42** in a concentration series of beta-estradiol using a fluorescence readout

Experimental results:
The LexA-ER-B42 induction can be measured by using a target gene encoding a fluorescence protein. *LexA-ER-B42 induction is different at different concentrations of inducer.*

Readout details

Experimental readout:
flow cytometry

Machine:
LSRII Fortessa

Comments

Publication:
Ottoz et al., Nucleic Acids Research, 2014

ELN example

2023

- ❑ An **electronic laboratory notebook** (also known as **electronic lab notebook** or **ELN**) is a software program or package designed to replace more traditional paper laboratory notebook (*https://www.limswiki.org/index.php/Electronic_laboratory_notebook*).

ELNs vs. paper notebooks

+

- Sharing
- Rights management
- Search functionality
- Easier to link digital data
- Can be backed up
- No issues with handwriting
- Who? Where? When? How? Track changes

−

- Learning curve
- Change in working mode required
- Time needed for introduction in lab

Wiki and note-keeping applications

❑ Wikis and note-keeping applications often considered ELN solutions.

❑ Popular in academia for ease of use.

❑ These are a straight replacement of paper notebooks, with some added functionalities, but do not provide a solution for data management.

Structured ELNs

openBIS

labfolder

SCINOTE

eLabFTW

Chemotion

RSpace

LabArchives

NOMAD

BIOVIA

❑ Additional functionalities compared to note-keeping applications (e.g. workflow management, chemical structures drawing, etc).

❑ Can be **discipline-specific** or **cross-disciplines**.

❑ Can have **LIMS** functionalities.

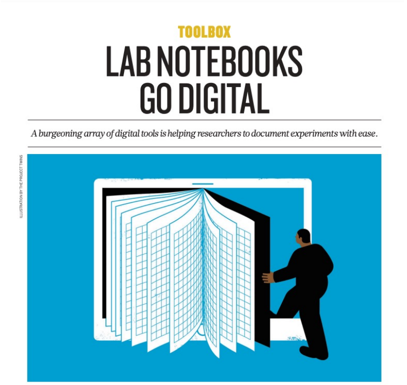
❑ Some systems offer an all-in-one solution for **RDM**.

❑ Can be integrated with third party applications.

Where to start when choosing which ELN to use?

- ❑ Is it for personal use or group use?
- ❑ Can I/we use a cloud-based solution?
- ❑ Do I/we need specific features?
- ❑ What do I/we want to do with the ELN? (e.g. only write experimental descriptions, manage samples, manage data – how big?, etc.)
- ❑ Commercial v. open-source.
- ❑ Budget?
- ❑ Can I export my data?

Some useful references on how to choose an ELN

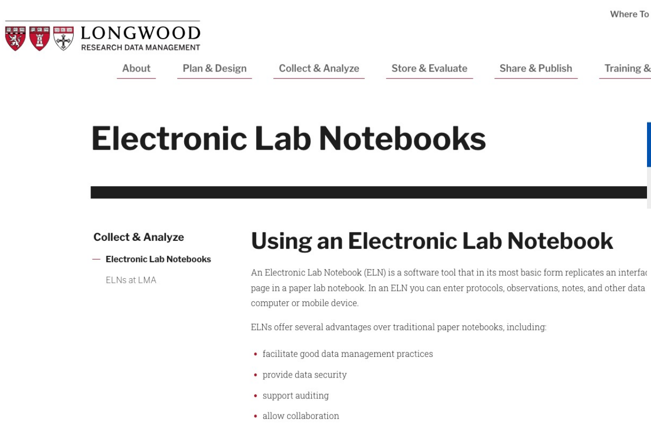


TOOLBOX

LAB NOTEBOOKS GO DIGITAL

A burgeoning array of digital tools is helping researchers to document experiments with ease.

https://www.nature.com/articles/d41586-018-05895-3



Electronic Lab Notebooks

Collect & Analyze

— Electronic Lab Notebooks

ELNs at LMA

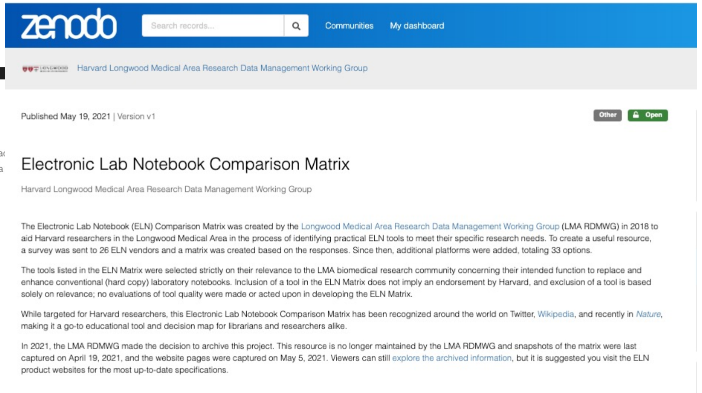
Using an Electronic Lab Notebook

An Electronic Lab Notebook (ELN) is a software tool that in its most basic form replicates an interfa page in a paper lab notebook. In an ELN you can enter protocols, observations, notes, and other data computer or mobile device.

ELNs offer several advantages over traditional paper notebooks, including:

- facilitate good data management practices
- provide data security
- support auditing
- allow collaboration

https://datamanagement.hms.harvard.edu/electronic-lab-notebooks



Harvard Longwood Medical Area Research Data Management Working Group

Published May 19, 2021 | Version v1

Electronic Lab Notebook Comparison Matrix

Harvard Longwood Medical Area Research Data Management Working Group

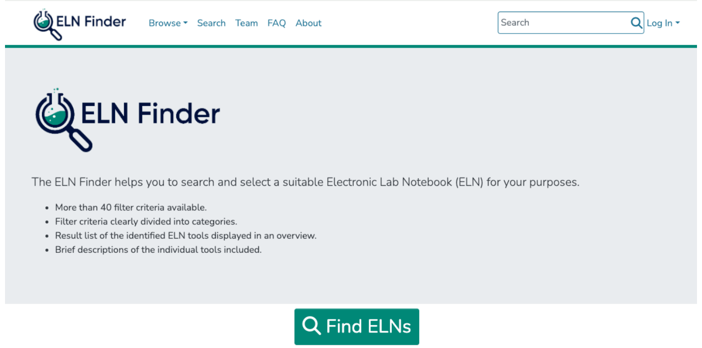
The Electronic Lab Notebook (ELN) Comparison Matrix was created by the Longwood Medical Area Research Data Management Working Group (LMA RDMWG) in 2018 to aid Harvard researchers in the Longwood Medical Area in the process of identifying practical ELN tools to meet their specific research needs. To create a useful resource, a survey was sent to 26 ELN vendors and a matrix was created based on the responses. Since then, additional platforms were added, totaling 33 options.

The tools listed in the ELN Matrix were selected strictly on their relevance to the LMA biomedical research community concerning their intended function to replace and enhance conventional (hard copy) laboratory notebooks. Inclusion of a tool in the ELN Matrix does not imply an endorsement by Harvard, and exclusion of a tool is based solely on relevance; no evaluations of tool quality were made or acted upon in developing the ELN Matrix.

While targeted for Harvard researchers, this Electronic Lab Notebook Comparison Matrix has been recognized around the world on Twitter, Wikipedia, and recently in *Nature*, making it a go-to educational tool and decision map for librarians and researchers alike.

In 2021, the LMA RDMWG made the decision to archive this project. This resource is no longer maintained by the LMA RDMWG and snapshots of the matrix were last captured on April 19, 2021, and the website pages were captured on May 5, 2021. Viewers can still explore the archived information, but it is suggested you visit the ELN product websites for the most up-to-date specifications.

https://zenodo.org/records/4723753

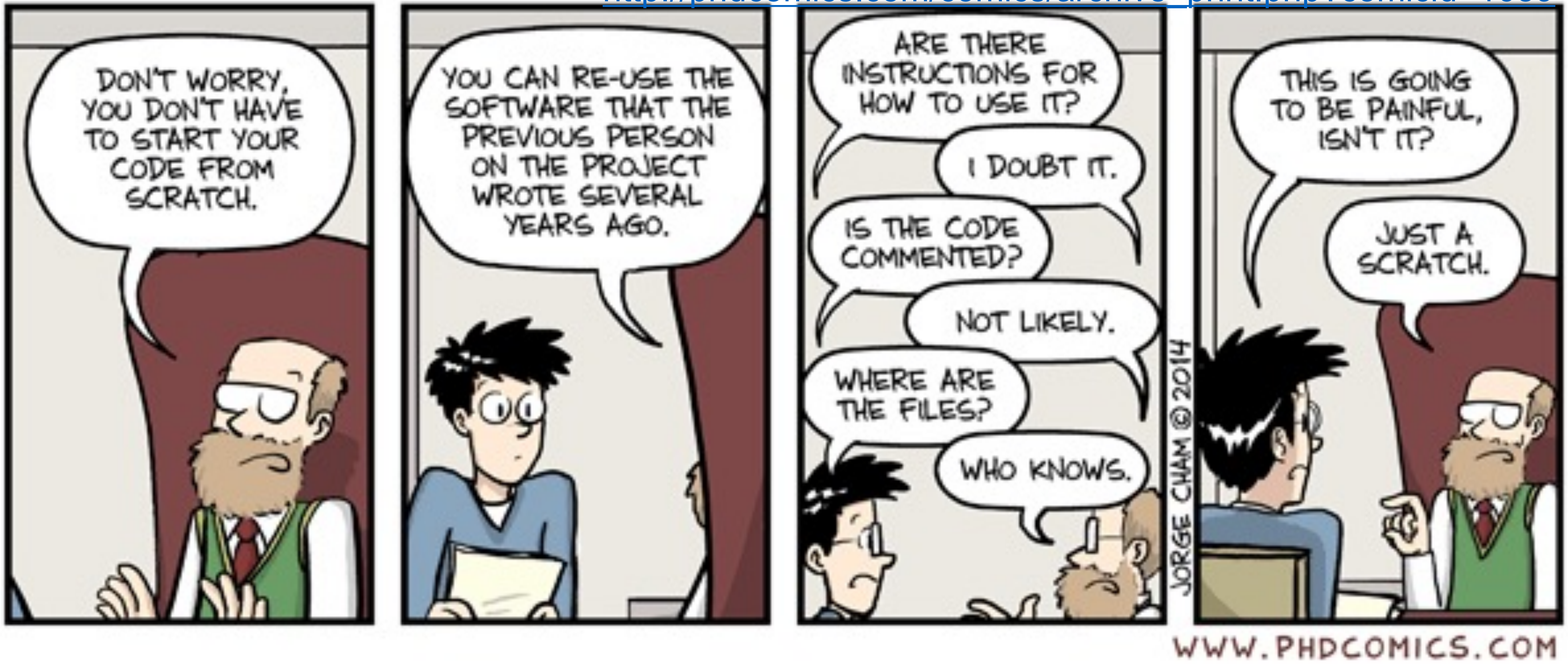


ELN Finder

The ELN Finder helps you to search and select a suitable Electronic Lab Notebook (ELN) for your purposes.

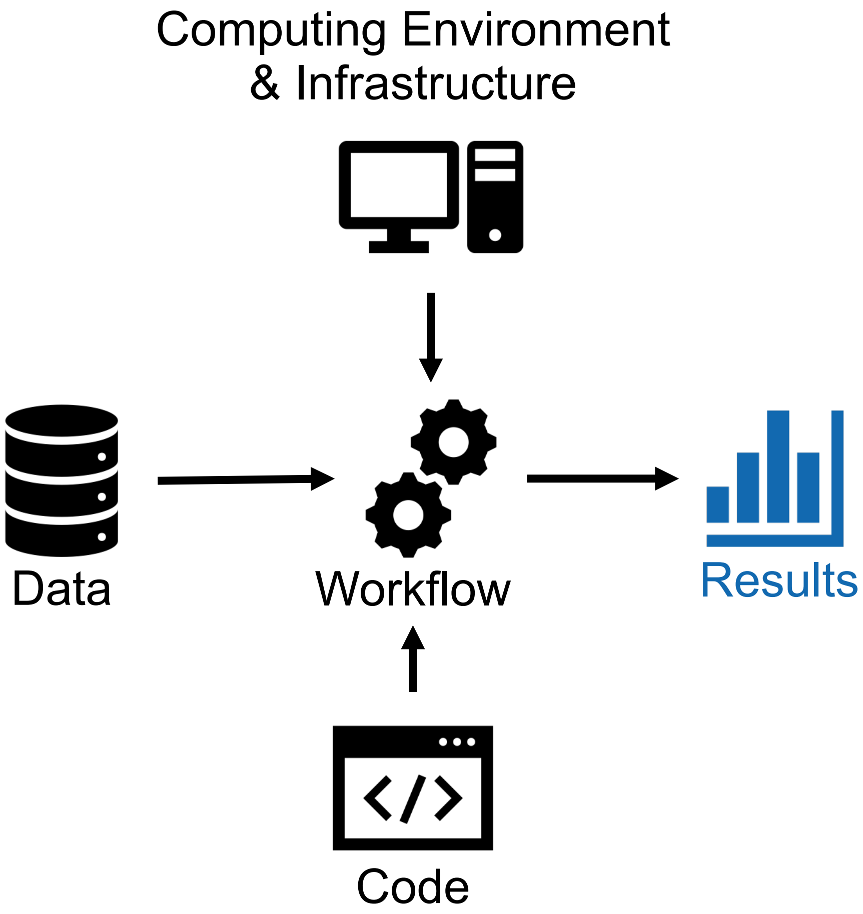
- More than 40 filter criteria available.
- Filter criteria clearly divided into categories.
- Result list of the identified ELN tools displayed in an overview.
- Brief descriptions of the individual tools included.

https://eln-finder.ulb.tu-darmstadt.de/home http://phdcomics.com/comics/archive_print.php?comicid=1689


DON'T WORRY, YOU DON'T HAVE TO START YOUR CODE FROM SCRATCH.
YOU CAN RE-USE THE SOFTWARE THAT THE PREVIOUS PERSON ON THE PROJECT WROTE SEVERAL YEARS AGO.
ARE THERE INSTRUCTIONS FOR HOW TO USE IT?
I DOUBT IT.
IS THE CODE COMMENTED?
NOT LIKELY.
WHERE ARE THE FILES?
WHO KNOWS.
JORGE CHAM © 2014
THIS IS GOING TO BE PAINFUL, ISN'T IT?
JUST A SCRATCH.
WWW.PHDCOMICS.COM

Reproducible Data Analysis

What do we mean by *Reproducibility*?



« ***Reproducibility*** is **obtaining consistent results** using the same input data; computational steps, methods, and code; and conditions of analysis. This definition is synonymous with "computational reproducibility"… »

- All components need to be reproducible!

National Academies of Sciences, Engineering, and Medicine. 2019. Reproducibility and Replicability in Science. https://doi.org/10.17226/25303.

Code management

Code

Version control systems

> Software tools specialized on managing and documenting changes to source code over time

> Necessary for managing large code bases

> Standard in professional software development

Interactive notebooks

> Applications that combine documentation, code, input and output generated by the code, e.g. graphs, plots (Nature 515, 151–152)

> Useful for exploratory data analysis and reproducibility

Workflow Management

Workflow

nextflow
snakemake
Apache Airflow
Open for Innovation KNIME®
Galaxy
COMMON WORKFLOW LANGUAGE

Workflow management systems

An incomplete list of **286** Computational Data Analysis Workflow Systems

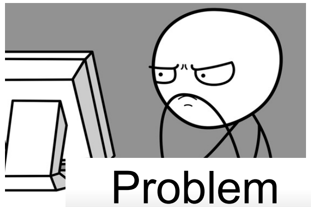
https://github.com/common-workflow-language/common-workflow-language/wiki/Existing-Workflow-systems

A curated list of **109** Awesome Pipeline frameworks & libraries + **30** Workflow platforms

https://github.com/pditommaso/awesome-pipeline

Reproducible Environment

Computing Environment and Infrastructure



Problem

Full reproducibility requires the possibility to recreate the system that was originally used to generate the results.

Solution

Bundle your application and all dependencies = Environment Isolation + Dependency Management

Environment and Package Management

docker

CONTAINER SERVICES

Containers

ORACLE VirtualBox

vmware®

Virtual Machines

CONDA

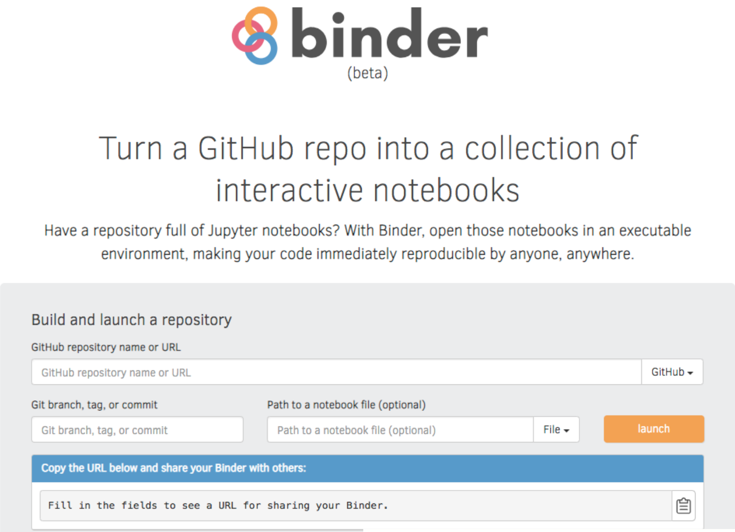
pytho virtualenv

renv

Environment & package management

Platforms for running code reproducibly

CODE OCEAN



binder (beta)

Turn a GitHub repo into a collection of interactive notebooks

Have a repository full of Jupyter notebooks? With Binder, open those notebooks in an executable environment, making your code immediately reproducible by anyone, anywhere.

Build and launch a repository

GitHub repository name or URL

Git branch, tag, or commit

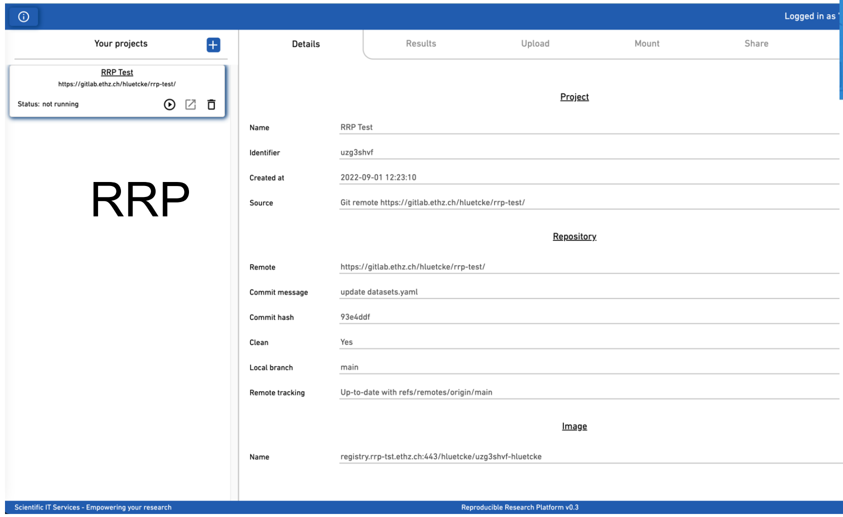
Path to a notebook file (optional)

Copy the URL below and share your Binder with others:

Fill in the fields to see a URL for sharing your Binder.

Copy the text below, then paste into your README to show a binder

GitHub repository name or URL
GitHub
Git branch, tag, or commit
Path to a notebook file (optional)
File
launch



RRP

Your projects

RRP Test
https://gitlab.ethz.ch/hluetcke/rrp-test/
Status: not running

Project

Name: RRP Test
Identifier: uzg3shvf
Created at: 2022-09-01 12:23:10
Source: Git remote https://gitlab.ethz.ch/hluetcke/rrp-test/

Repository

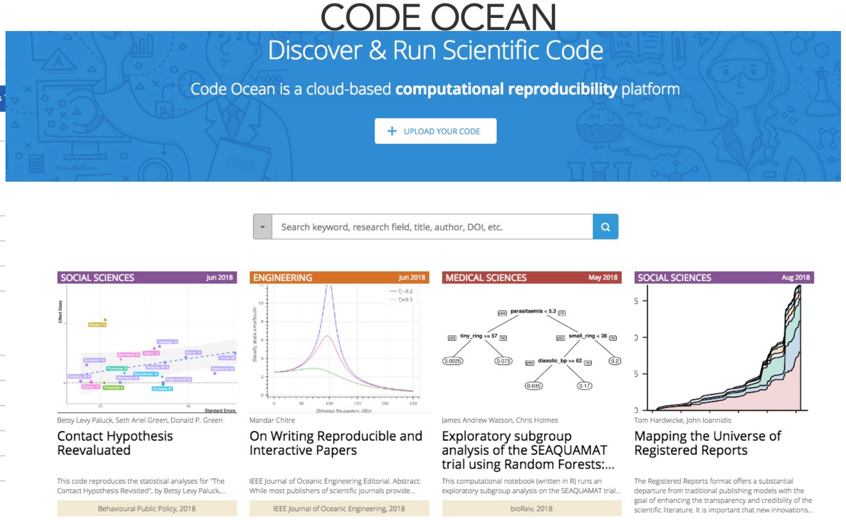
Remote: https://gitlab.ethz.ch/hluetcke/rrp-test/
Commit message: update datasets.yaml
Commit hash: 93e4ddf
Clean: Yes
Local branch: main
Remote tracking: Up-to-date with refs/remotes/origin/main

Image

Name: registry.rrp-tst.ethz.ch:443/hluetcke/uzg3shvf-hluetcke

Scientific IT Services - Empowering your research

Reproducible Research Platform v0.3



Discover & Run Scientific Code

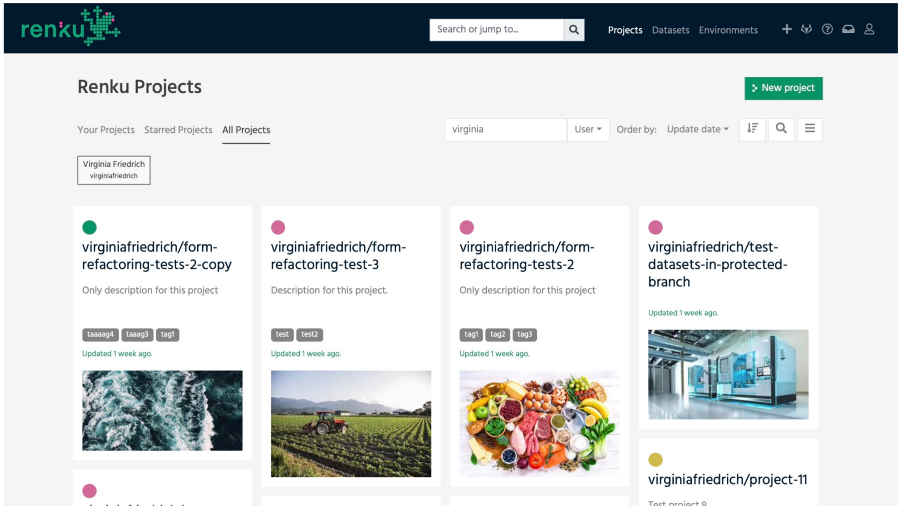
Code Ocean is a cloud-based **computational reproducibility** platform

SOCIAL SCIENCES Jun 2018
Betsy Levy Paluck, Seth Ariel Green, Donald P. Green
Contact Hypothesis Reevaluated
This code reproduces the statistical analyses for "The Contact Hypothesis Revisited", by Betsy Levy Paluck,...
Behavioural Public Policy, 2018

ENGINEERING Jun 2018
Mandar Chitre
On Writing Reproducible and Interactive Papers
IEEE Journal of Oceanic Engineering Editorial. Abstract: While most publishers of scientific journals provide...
IEEE Journal of Oceanic Engineering, 2018

MEDICAL SCIENCES May 2018
James Andrew Watson, Chris Holmes
Exploratory subgroup analysis of the SEAQUAMAT trial using Random Forests:...
This computational notebook (written in R) runs an exploratory subgroup analysis on the SEAQUAMAT trial...
bioRxiv, 2018

SOCIAL SCIENCES Aug 2018
Tom Hardwicke, John Ioannidis
Mapping the Universe of Registered Reports
The Registered Reports format offers a substantial departure from traditional publishing models with the goal of enhancing the transparency and credibility of the scientific literature. It is important that new innovations...



Renku Projects

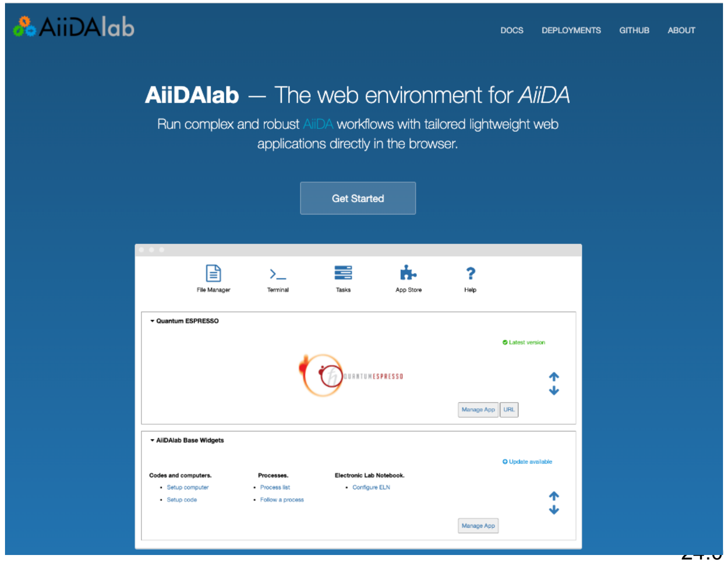
virginiafriedrich/form-refactoring-tests-2-copy
Only description for this project
Updated 1 week ago.

virginiafriedrich/form-refactoring-test-3
Description for this project.
Updated 1 week ago.

virginiafriedrich/form-refactoring-tests-2
Only description for this project
Updated 1 week ago.

virginiafriedrich/test-datasets-in-protected-branch
Updated 1 week ago.

virginiafriedrich/project-11
Test project 9



AiiDAlab — The web environment for *AiiDA*

Run complex and robust AiiDA workflows with tailored lightweight web applications directly in the browser.

Quantum ESPRESSO

AiiDAlab Base Widgets

Codes and computers.
- Setup computer
- Setup code

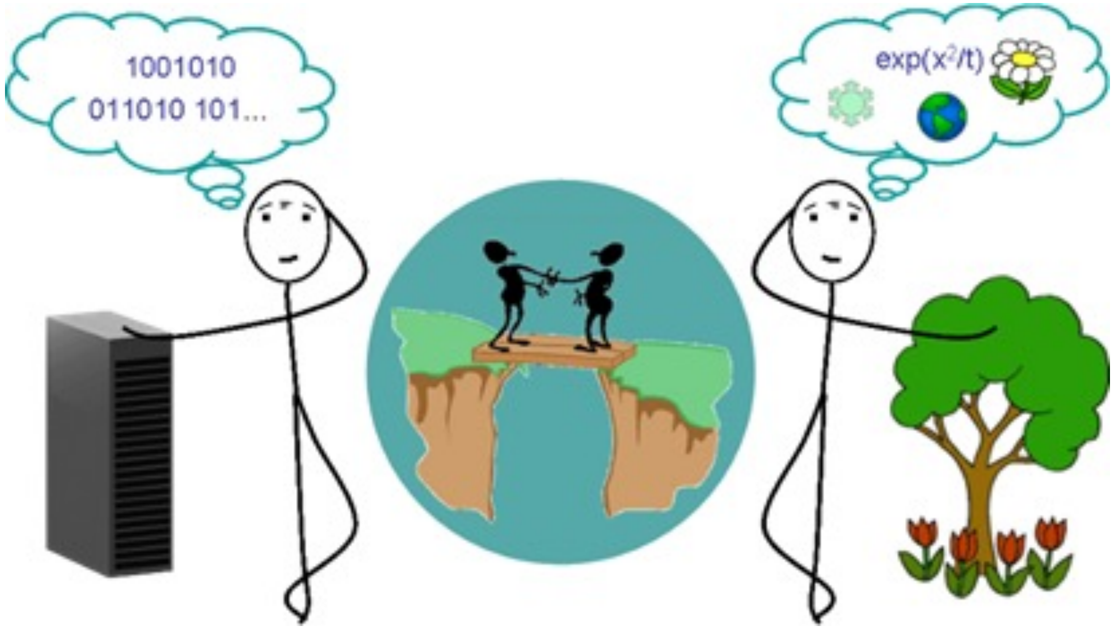
Processes.
- Process list
- Follow a process

Electronic Lab Notebook.
- Configure ELN

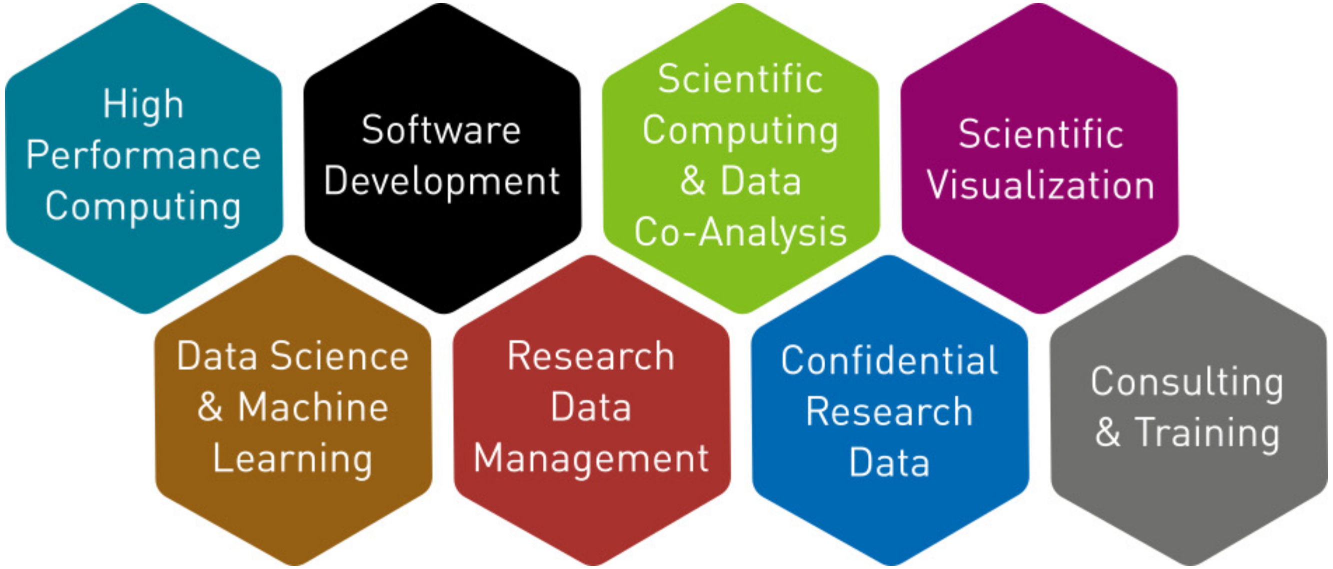
Take home messages

- □ Efficient RDM during the lifetime of a project is necessary to meet FAIR data requirements.
- □ RDM should be an integral part of every researcher’s daily work.
- □ Several tools are available for RDM. There is no „*one-fits-all*“ solution, but every use-case should find the most appropriate solution(s) for them.
- □ Talk to the RDM experts in your institution!

Scientific IT Services: bridging the gap between research and IT



Who is Scientific IT Services of ETH Zurich?



High Performance Computing

Software Development

Scientific Computing & Data Co-Analysis

Scientific Visualization

Data Science & Machine Learning

Research Data Management

Confidential Research Data

Consulting & Training

❑ A section of ETHZ IT Services

❑ Around 50 experts in various areas of scientific computing

❑ With a background in different areas of science

Scientific IT Services: 4 groups

Research Platforms

High Performance Computing

Software development

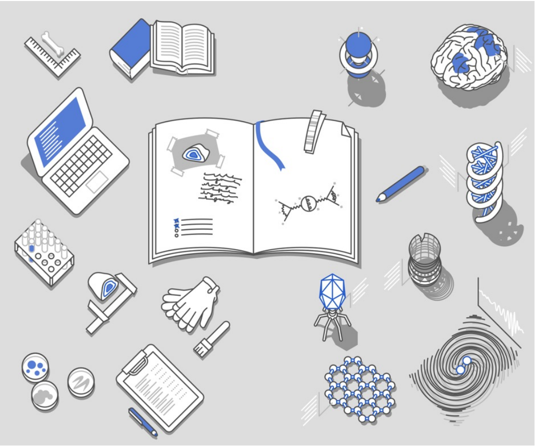
Computational and Data Science Support

Scientific IT Services

Research Platforms

- □ Research data management services (openBIS)
- □ Confidential research data
- □ LeonhardMed
- □ GFB sequencing core facility data support

openBIS

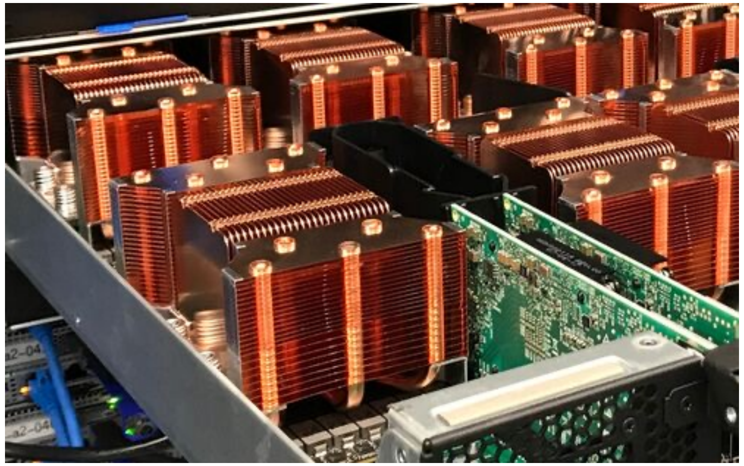


NV NGSvivo

Scientific IT Services

- ❑ Scientific computing
- ❑ EULER cluster

High Performance Computing



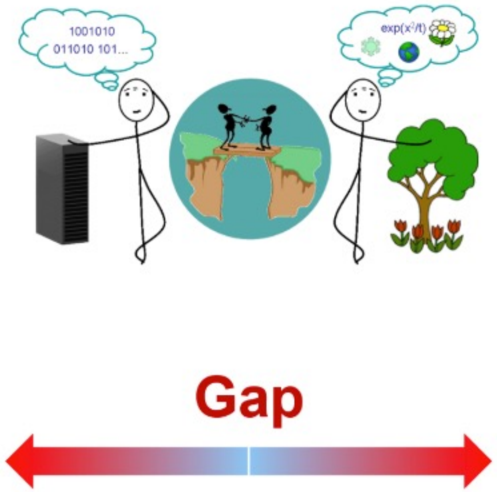
Scientific IT Services

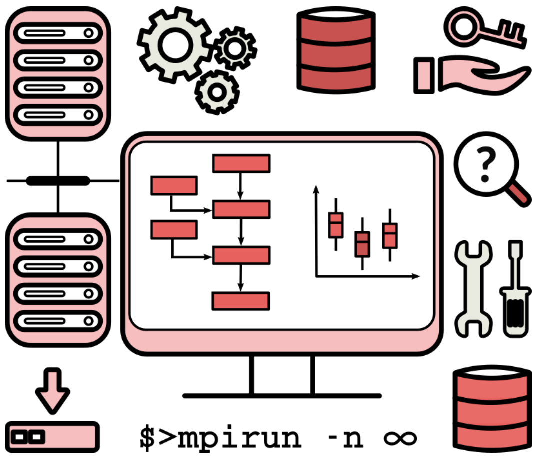
```
        poly_coefs
            1.27819383e-02 , -6.3
          , -1.56646018e-03 , 2.1
          , -3.32780636e-04 , -6.8
          , -4.58039151e-03 , 6.9
          , -6.89612286e-03 , -1.1
          , 8.43028811e-04 , -2.4
          , 4.11527629e-05 , 6.1
          , 1.13904392e-03 ,
          ,

    def polyval2d(X, ww, order=p
        from sklearn.preprocessi
        poly = PolynomialFeature
        Xt = poly.fit_transform(
        zz = np.dot(Xt, ww)
        return zz
```

Software development

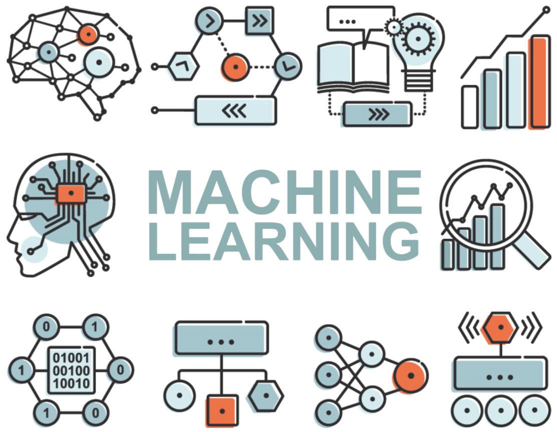
- ❑ openBIS development
- ❑ Custom software development
- ❑ Scientific visualizations
- ❑ Scientific code support

Scientific IT Services





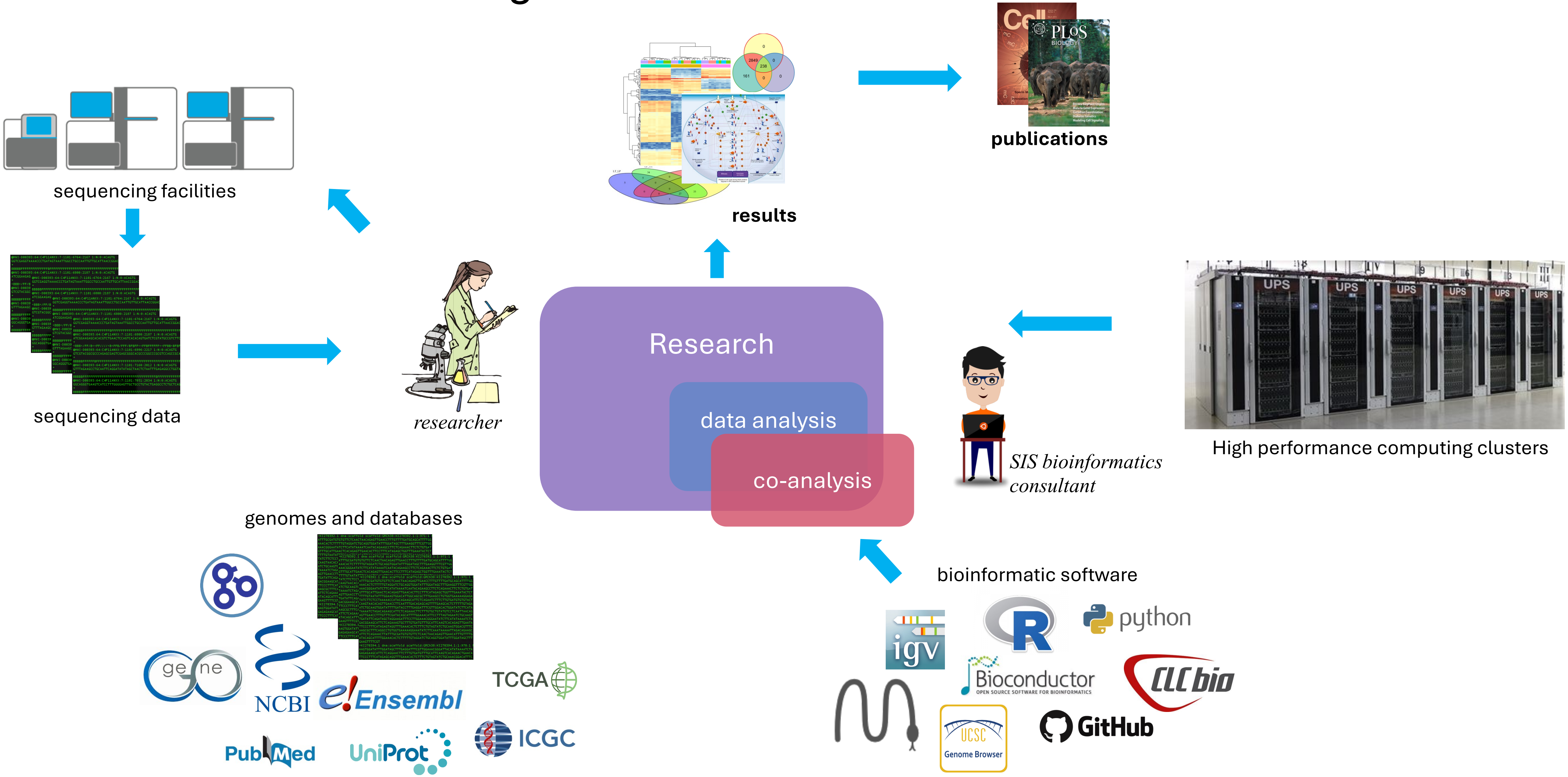
```
$>mpirun -n ∞
```



- □ Scientific IT consulting
- □ “Glue” between the SIS units
- □ Data science
- □ Data co-analysis
- □ Machine Learning/ AI

Computational and Data Science Support

Bionformatics consulting



sequencing facilities

sequencing data

researcher

Research

data analysis

co-analysis

results

publications

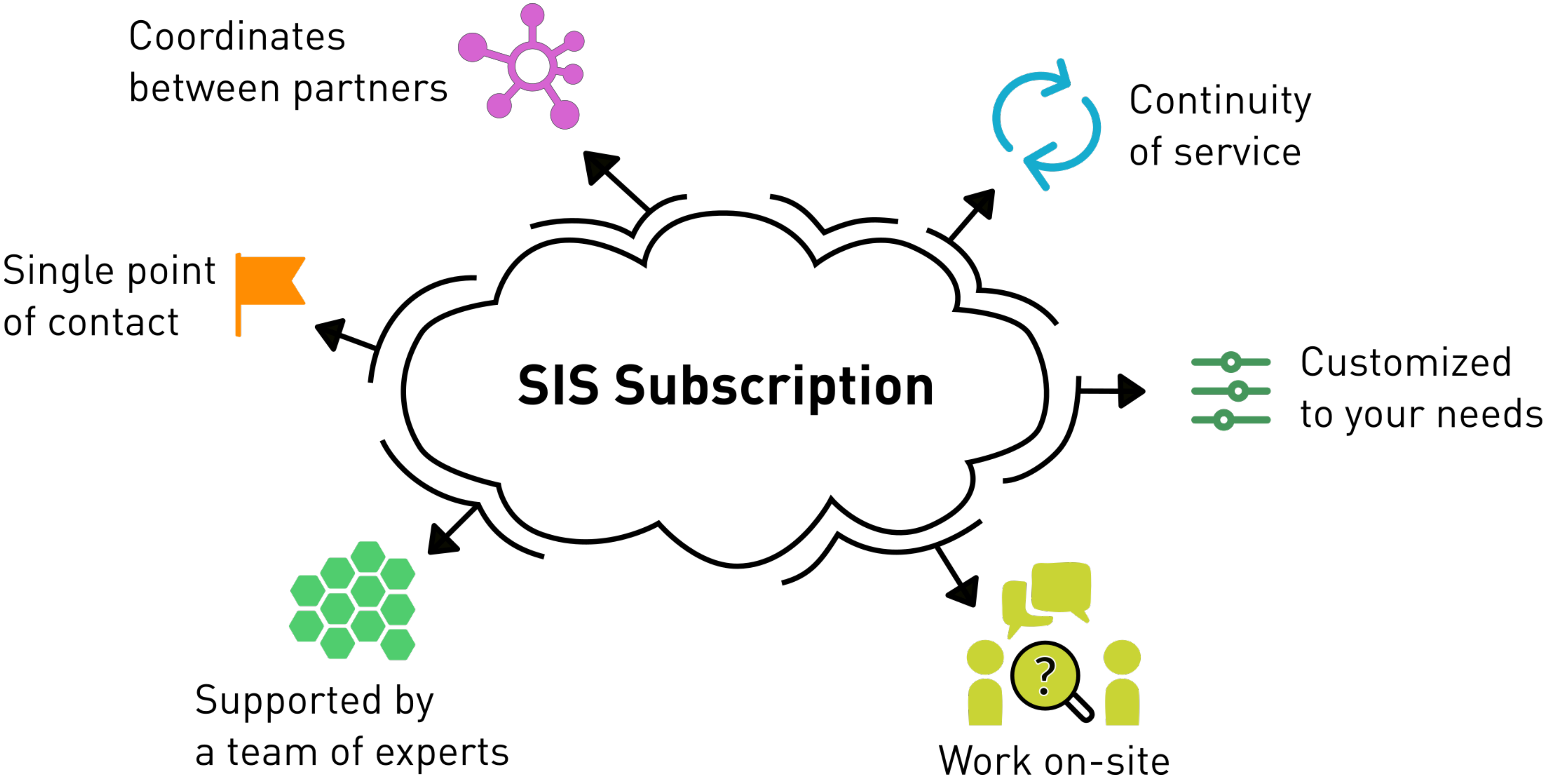
SIS bioinformatics consultant

High performance computing clusters

genomes and databases

bioinformatic software

Scientific IT Services



SIS Subscription

Coordinates between partners

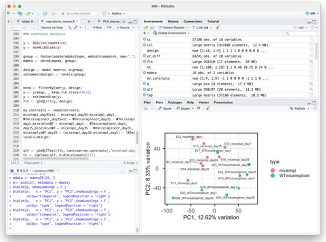
Continuity of service

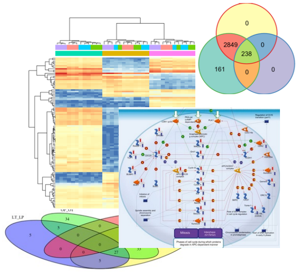
Single point of contact

Customized to your needs

Supported by a team of experts

Work on-site





Findable **A**ccessible **I**nteroperable **R**eusable

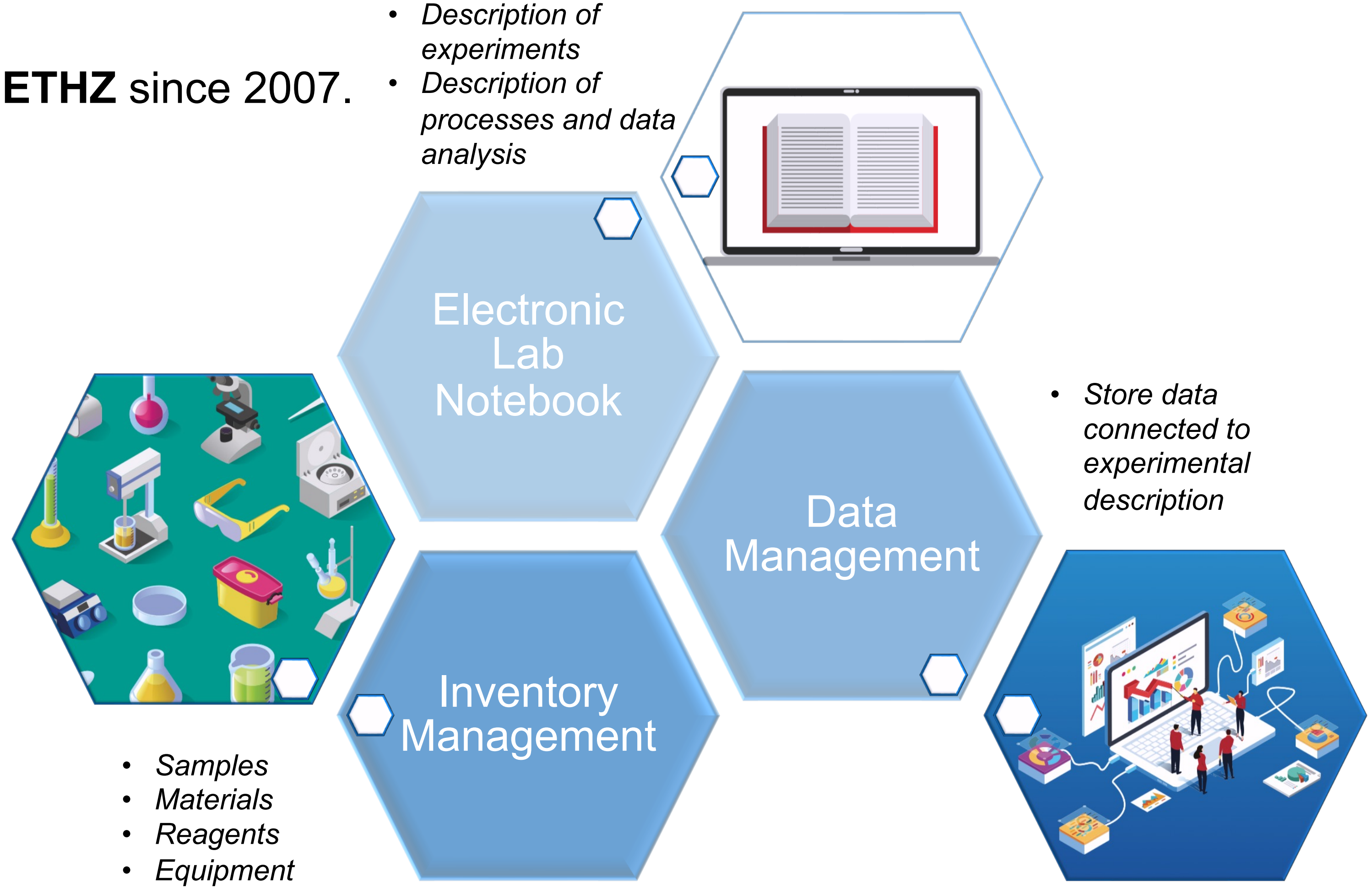
added value

openBIS

The ETHZ Scientific IT Services data management solution for research groups

openBIS: a complete solution towards FAIR data management

❑ Developed at **ETHZ** since 2007.



- *Description of experiments*
- *Description of processes and data analysis*

- *Store data connected to experimental description*

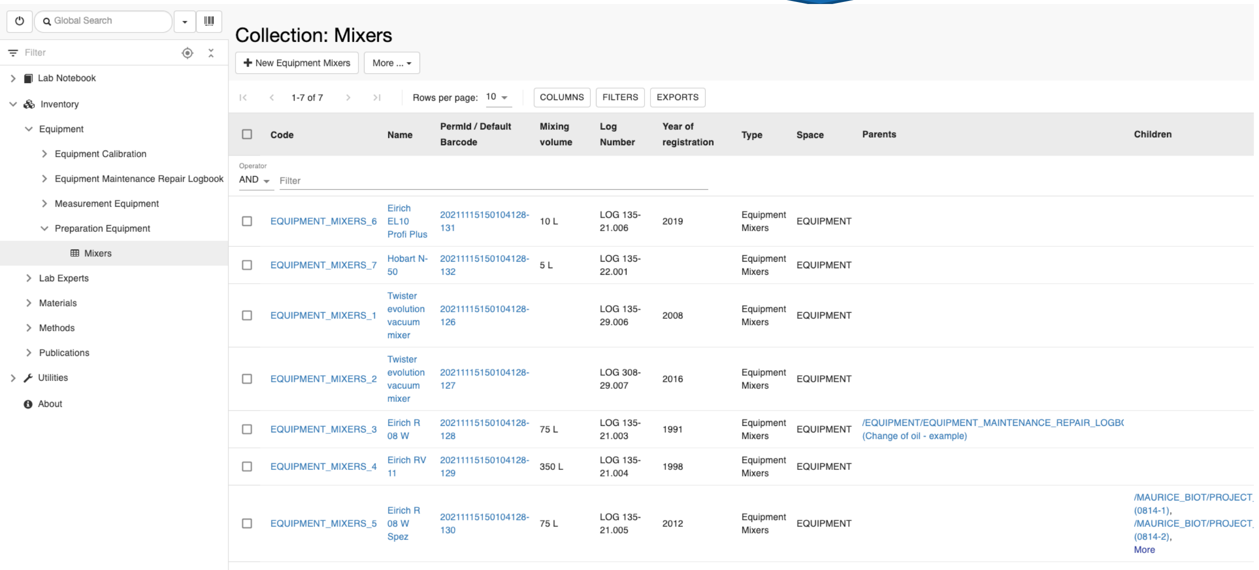
- *Samples*
- *Materials*
- *Reagents*
- *Equipment*
- *SOPs*

https://openbis.ch

Inventory management

openBIS

Lab equipment



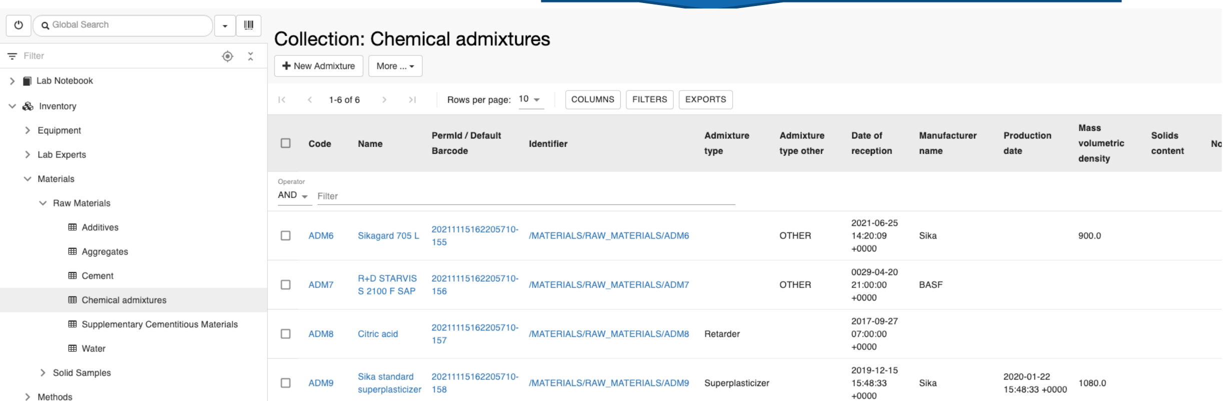
Collection: Mixers

1-7 of 7 Rows per page: 10

Operator AND Filter

Code	Name	PermId / Default Barcode	Mixing volume	Log Number	Year of registration	Type	Space	Parents	Children
EQUIPMENT_MIXERS_6	Eirich EL10 Profi Plus	20211115150104128-131	10 L	LOG 135-21.006	2019	Equipment Mixers	EQUIPMENT		
EQUIPMENT_MIXERS_7	Hobart N-50	20211115150104128-132	5 L	LOG 135-22.001		Equipment Mixers	EQUIPMENT		
EQUIPMENT_MIXERS_1	Twister evolution vacuum mixer	20211115150104128-126		LOG 135-29.006	2008	Equipment Mixers	EQUIPMENT		
EQUIPMENT_MIXERS_2	Twister evolution vacuum mixer	20211115150104128-127		LOG 308-29.007	2016	Equipment Mixers	EQUIPMENT		
EQUIPMENT_MIXERS_3	Eirich R 08 W	20211115150104128-128	75 L	LOG 135-21.003	1991	Equipment Mixers	EQUIPMENT	/EQUIPMENT/EQUIPMENT_MAINTENANCE_REPAIR_LOGB((Change of oil - example)	
EQUIPMENT_MIXERS_4	Eirich RV 11	20211115150104128-129	350 L	LOG 135-21.004	1998	Equipment Mixers	EQUIPMENT		
EQUIPMENT_MIXERS_5	Eirich R 08 W Spez	20211115150104128-130	75 L	LOG 135-21.005	2012	Equipment Mixers	EQUIPMENT		/MAURICE_BIOT/PROJECT_ (0814-1), /MAURICE_BIOT/PROJECT_ (0814-2), More

Lab samples & materials



Collection: Chemical admixtures

1-6 of 6 Rows per page: 10

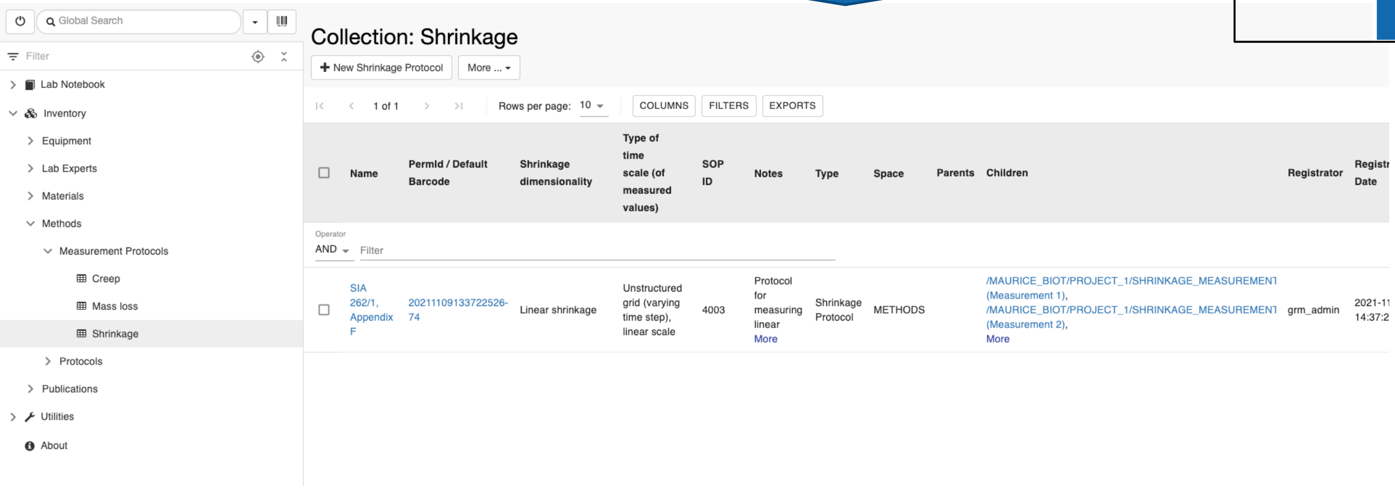
Operator AND Filter

Code	Name	PermId / Default Barcode	Identifier	Admixture type	Admixture type other	Date of reception	Manufacturer name	Production date	Mass volumetric density	Solids content	No
ADM6	Sikagard 705 L	20211115162205710-155	/MATERIALS/RAW_MATERIALS/ADM6		OTHER	2021-06-25 14:20:09 +0000	Sika		900.0		
ADM7	R+D STARVIS S 2100 F SAP	20211115162205710-156	/MATERIALS/RAW_MATERIALS/ADM7		OTHER	0029-04-20 21:00:00 +0000	BASF				
ADM8	Citric acid	20211115162205710-157	/MATERIALS/RAW_MATERIALS/ADM8	Retarder		2017-09-27 07:00:00 +0000					
ADM9	Sika standard superplasticizer	20211115162205710-158	/MATERIALS/RAW_MATERIALS/ADM9	Superplasticizer		2019-12-15 15:48:33 +0000	Sika	2020-01-22 15:48:33 +0000	1080.0		
ADM10	Lithium Carbonate	20211115162205710-159	/MATERIAL						2110.0		
ADM11	No.W.A. 130	20211115162205710-160	/MATERIAL						1070.0		

Samples' storage manager

Barcode reader

Lab procedures

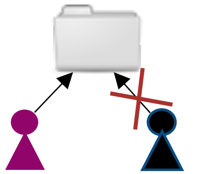


Collection: Shrinkage

1 of 1 Rows per page: 10

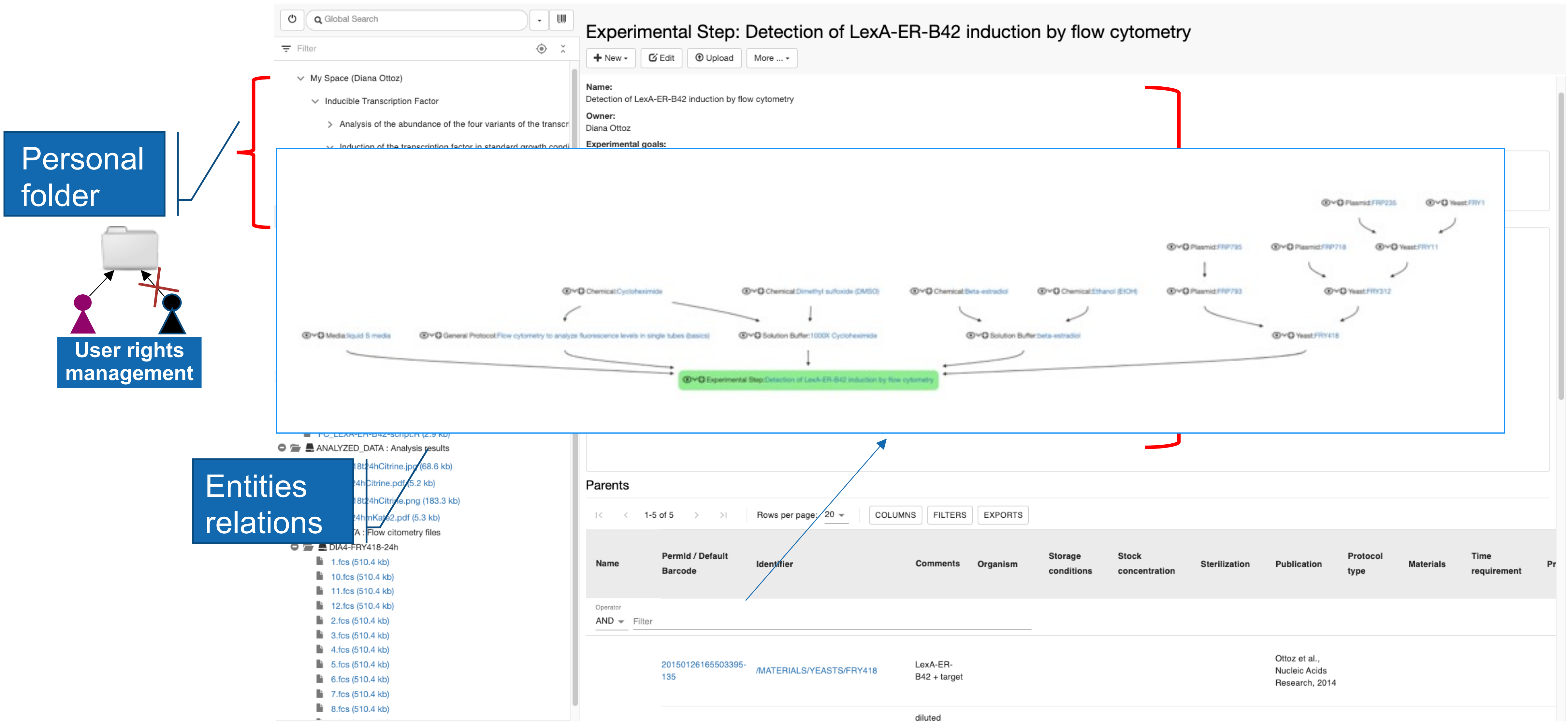
Operator AND Filter

Name	PermId / Default Barcode	Shrinkage dimensionality	Type of time scale (of measured values)	SOP ID	Notes	Type	Space	Parents	Children	Registrator	Registr Date
SIA 262/1, Appendix F	20211109133722526-74	Linear shrinkage	Unstructured grid (varying time step), linear scale	4003	Protocol for measuring linear More	Shrinkage Protocol	METHODS		/MAURICE_BIOT/PROJECT_1/SHRINKAGE_MEASUREMENT (Measurement 1), /MAURICE_BIOT/PROJECT_1/SHRINKAGE_MEASUREMENT (Measurement 2), More	grm_admin	2021-11 14:37:2



User rights management

Electronic Lab Notebook



Personal folder

User rights management

Entities relations

- My Space (Diana Ottoz)
  - Inducible Transcription Factor
    - Analysis of the abundance of the four variants of the transcr
    - Induction of the transcription factor in standard growth condi

FC_LEXA-ER-B42-script.R (2.9 kb)

ANALYZED_DATA : Analysis results

- 18t24hCitrine.jpg (68.6 kb)
- 24hCitrine.pdf (5.2 kb)
- 18t24hCitrine.png (183.3 kb)
- 24hmKate2.pdf (5.3 kb)

A : Flow citometry files

DIA4-FRY418-24h

- 1.fcs (510.4 kb)
- 10.fcs (510.4 kb)
- 11.fcs (510.4 kb)
- 12.fcs (510.4 kb)
- 2.fcs (510.4 kb)
- 3.fcs (510.4 kb)
- 4.fcs (510.4 kb)
- 5.fcs (510.4 kb)
- 6.fcs (510.4 kb)
- 7.fcs (510.4 kb)
- 8.fcs (510.4 kb)

Experimental Step: Detection of LexA-ER-B42 induction by flow cytometry

Name:
Detection of LexA-ER-B42 induction by flow cytometry

Owner:
Diana Ottoz

Experimental goals:

Plasmid:FRP235
Yeast:FRY1
Plasmid:FRP795
Plasmid:FRP718
Yeast:FRY11
Chemical:Cycloheximide
Chemical:Dimethyl sulfoxide (DMSO)
Chemical:Beta-estradiol
Chemical:Ethanol (EtOH)
Plasmid:FRP793
Yeast:FRY312
Media:liquid S media
General Protocol:Flow cytometry to analyze fluorescence levels in single tubes (basics)
Solution Buffer:1000X Cycloheximide
Solution Buffer:beta-estradiol
Yeast:FRY418
Experimental Step:Detection of LexA-ER-B42 induction by flow cytometry

Parents

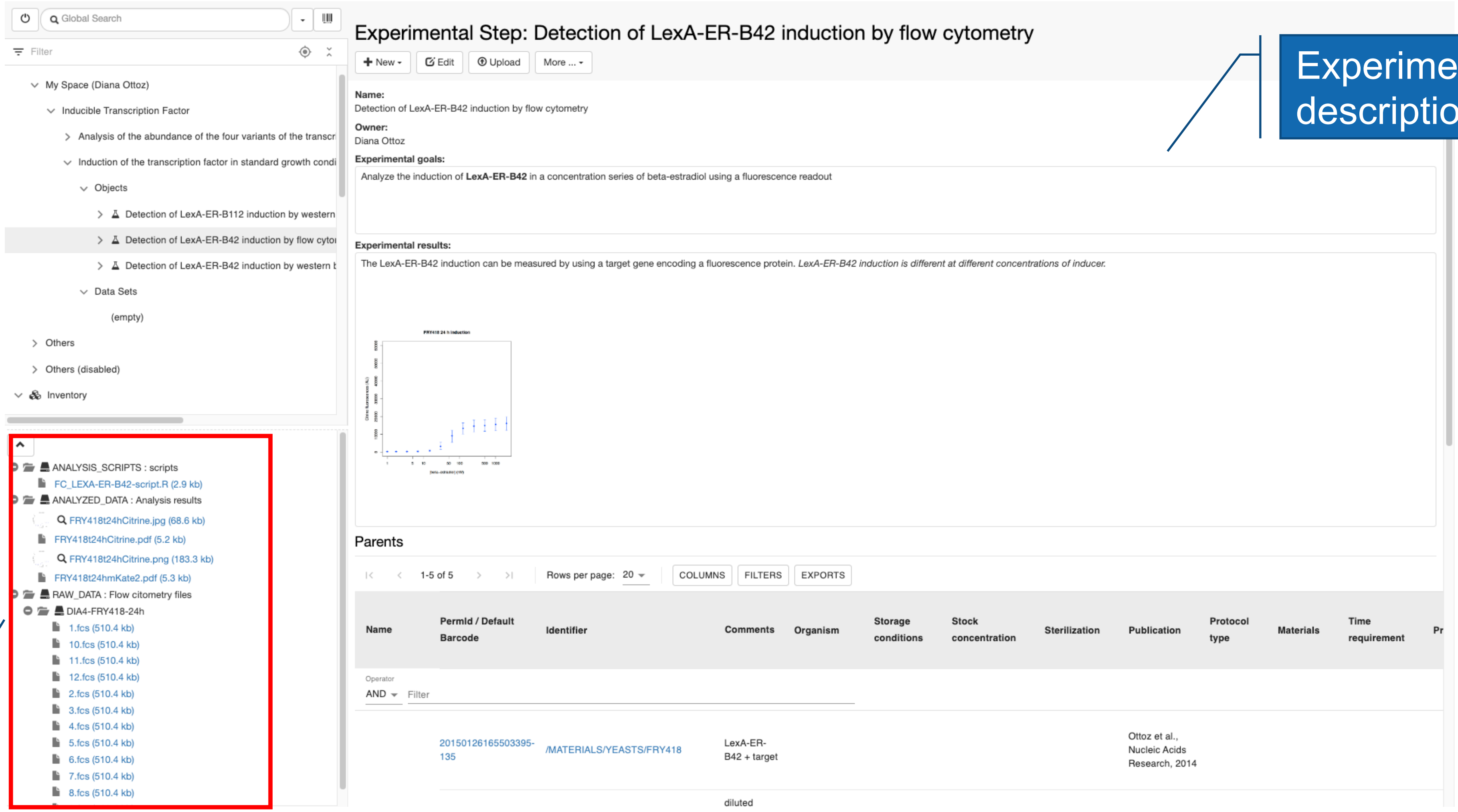
1-5 of 5 Rows per page: 20

Name	Permld / Default Barcode	Identifier	Comments	Organism	Storage conditions	Stock concentration	Sterilization	Publication	Protocol type	Materials	Time requirement	Pr
	20150126165503395-135	/MATERIALS/YEASTS/FRY418	LexA-ER-B42 + target					Ottoz et al., Nucleic Acids Research, 2014				
			diluted									

Operator AND Filter

Data management

- ❑ Data are always connected to experimental descriptions



Global Search
Filter
My Space (Diana Ottoz)
Inducible Transcription Factor
Analysis of the abundance of the four variants of the transcr
Induction of the transcription factor in standard growth condi
Objects
Detection of LexA-ER-B112 induction by western
Detection of LexA-ER-B42 induction by flow cytor
Detection of LexA-ER-B42 induction by western b
Data Sets
(empty)
Others
Others (disabled)
Inventory
+ New
Edit
Upload
More ...
FRY418 24 h induction

ANALYSIS_SCRIPTS : scripts
FC_LEXA-ER-B42-script.R (2.9 kb)
ANALYZED_DATA : Analysis results
FRY418t24hCitrine.jpg (68.6 kb)
FRY418t24hCitrine.pdf (5.2 kb)
FRY418t24hCitrine.png (183.3 kb)
FRY418t24hmKate2.pdf (5.3 kb)
RAW_DATA : Flow citometry files
DIA4-FRY418-24h
1.fcs (510.4 kb)
10.fcs (510.4 kb)
11.fcs (510.4 kb)
12.fcs (510.4 kb)
2.fcs (510.4 kb)
3.fcs (510.4 kb)
4.fcs (510.4 kb)
5.fcs (510.4 kb)
6.fcs (510.4 kb)
7.fcs (510.4 kb)
8.fcs (510.4 kb)

Experimental Step: Detection of LexA-ER-B42 induction by flow cytometry

Name:
Detection of LexA-ER-B42 induction by flow cytometry

Owner:
Diana Ottoz

Experimental goals:
Analyze the induction of **LexA-ER-B42** in a concentration series of beta-estradiol using a fluorescence readout

Experimental results:
The LexA-ER-B42 induction can be measured by using a target gene encoding a fluorescence protein. *LexA-ER-B42 induction is different at different concentrations of inducer.*

Parents

1-5 of 5 Rows per page: 20 COLUMNS FILTERS EXPORTS

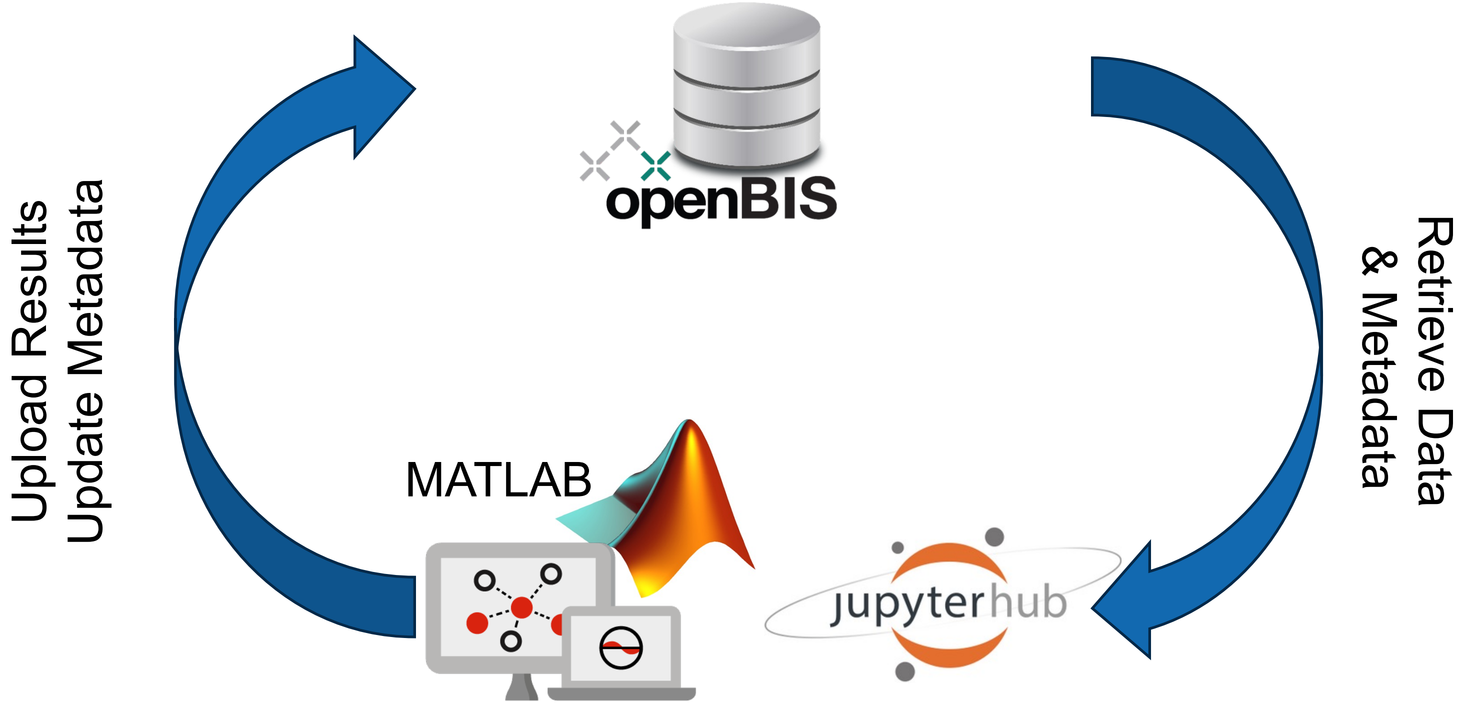
Operator AND Filter

Name	PermId / Default Barcode	Identifier	Comments	Organism	Storage conditions	Stock concentration	Sterilization	Publication	Protocol type	Materials	Time requirement	Pr
	20150126165503395-135	/MATERIALS/YEASTS/FRY418	LexA-ER-B42 + target					Ottoz et al., Nucleic Acids Research, 2014				
			diluted									

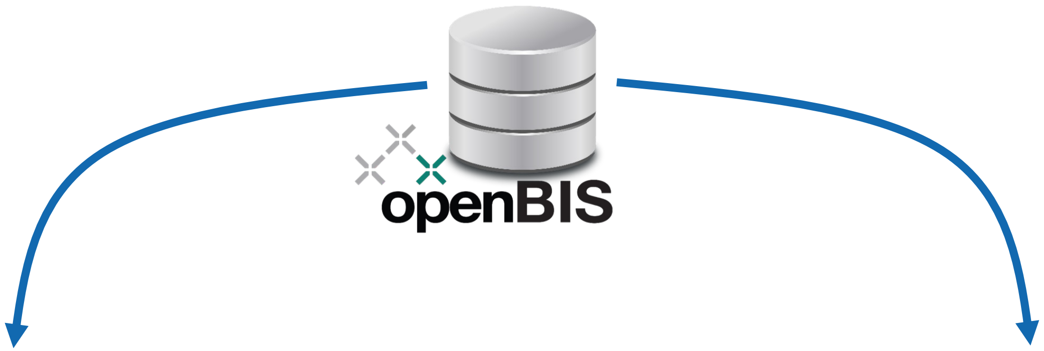
Experimental description

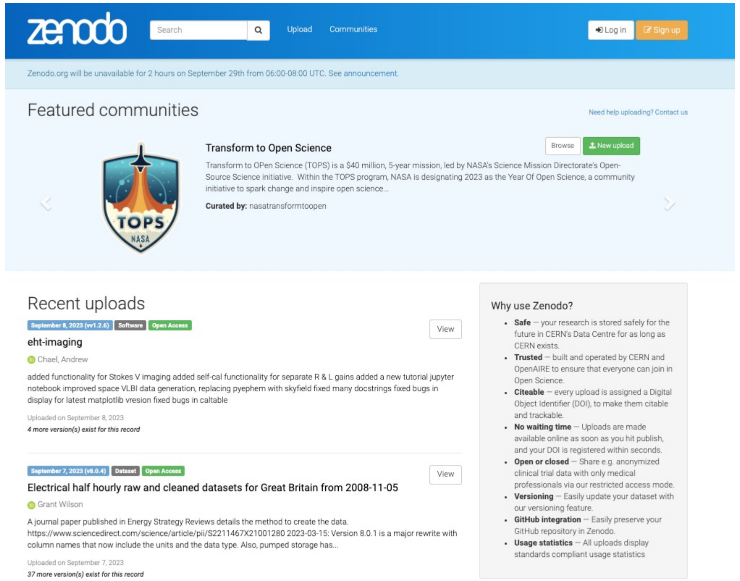
Data

Data analysis: JupyterHub & MATLAB



Data publication: export to ETH Research Collection & Zenodo





Zenodo.org will be unavailable for 2 hours on September 29th from 06:00-08:00 UTC. See announcement.

Featured communities

Need help uploading? Contact us

Transform to Open Science

Transform to OPen Science (TOPS) is a $40 million, 5-year mission, led by NASA's Science Mission Directorate's Open-Source Science initiative. Within the TOPS program, NASA is designating 2023 as the Year Of Open Science, a community initiative to spark change and inspire open science...

Curated by: nasatransformtoopen

Recent uploads

September 8, 2023 (vv1.2.6) Software Open Access

eht-imaging

Chael, Andrew

added functionality for Stokes V imaging added self-cal functionality for separate R & L gains added a new tutorial jupyter notebook improved space VLBI data generation, replacing pyephem with skyfield fixed many docstrings fixed bugs in display for latest matplotlib vresion fixed bugs in caltable

Uploaded on September 8, 2023

4 more version(s) exist for this record

September 7, 2023 (v8.0.4) Dataset Open Access

Electrical half hourly raw and cleaned datasets for Great Britain from 2008-11-05

Grant Wilson

A journal paper published in Energy Strategy Reviews details the method to create the data. https://www.sciencedirect.com/science/article/pii/S2211467X21001280 2023-03-15: Version 8.0.1 is a major rewrite with column names that now include the units and the data type. Also, pumped storage has...

Uploaded on September 7, 2023

37 more version(s) exist for this record

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- **Safe** — your research is stored safely for the future in CERN's Data Centre for as long as CERN exists.
- **Trusted** — built and operated by CERN and OpenAIRE to ensure that everyone can join in Open Science.
- **Citeable** — every upload is assigned a Digital Object Identifier (DOI), to make them citable and trackable.
- **No waiting time** — Uploads are made available online as soon as you hit publish, and your DOI is registered within seconds.
- **Open or closed** — Share e.g. anonymized clinical trial data with only medical professionals via our restricted access mode.
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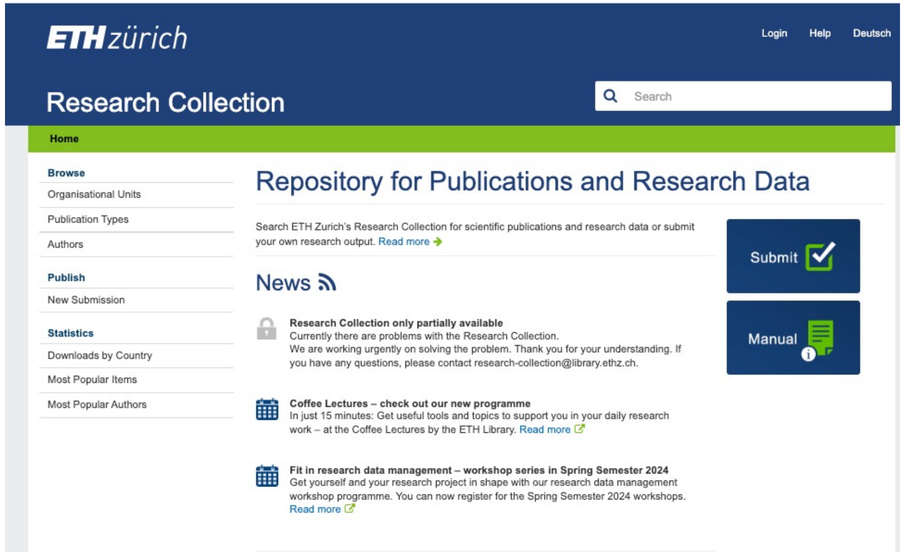
- **GitHub integration** — Easily preserve your GitHub repository in Zenodo.
- **Usage statistics** — All uploads display standards compliant usage statistics



Repository for Publications and Research Data

Search ETH Zurich's Research Collection for scientific publications and research data or submit your own research output. Read more

News

Research Collection only partially available
Currently there are problems with the Research Collection.
We are working urgently on solving the problem. Thank you for your understanding. If you have any questions, please contact research-collection@library.ethz.ch.

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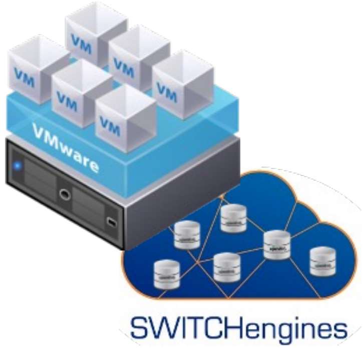
Fit in research data management – workshop series in Spring Semester 2024
Get yourself and your research project in shape with our research data management workshop programme. You can now register for the Spring Semester 2024 workshops.
Read more

RDM services offered BY ETHZ SIS

□ Services for ETHZ researchers

□ Services for Swiss academic scientists (openrdm.swiss)



openBIS installation on ETHZ infrastructure (ETH customers) /cloud (Swiss academic customers).

openBIS + OS maintenance & upgrades

Consulting

Tailored data modelling

Training

User support