Electronic Laboratory Notebooks (ELN)

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J. Heyrovsky Institute of Physical Chemistry

Czech Academy of Sciences

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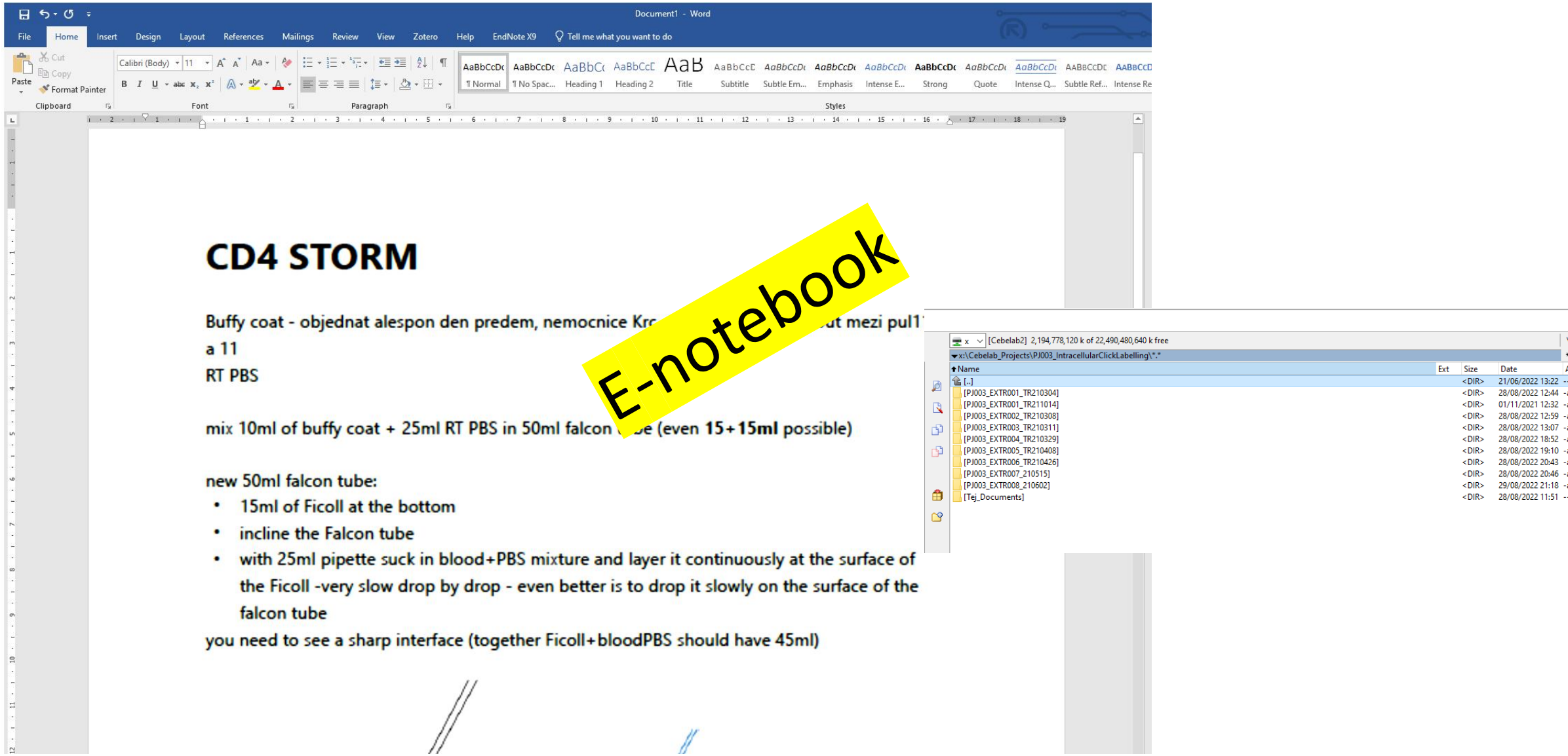
Routine abbreviations

- Electronic Laboratory Notebook (ELN)
- Laboratory Information Management System (LIMS)
- Research Data Management (RDM)
- FAIR principles …. Findable, accessible, interoperable, reusable
- Machine-actionable (MA)

Outline

- What is ELN?
- Why to use ELN?
- If yes, which ELN to use?
- (Automatisation)


Document1 - Word
File
Home
Insert
Design
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References
Mailings
Review
View
Zotero
Help
EndNote X9
Tell me what you want to do
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Calibri (Body)
11
Font
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Heading 1
Heading 2
Title
Subtitle
Subtle Em...
Emphasis
Intense E...
Strong
Quote
Intense Q...
Subtle Ref...
Intense Re
CD4 STORM
Buffy coat - objednat alespon den predem, nemocnice Kr
ut mezi pul1
a 11
RT PBS
mix 10ml of buffy coat + 25ml RT PBS in 50ml falcon
e (even 15+15ml possible)
new 50ml falcon tube:
• 15ml of Ficoll at the bottom
• incline the Falcon tube
• with 25ml pipette suck in blood+PBS mixture and layer it continuously at the surface of the Ficoll -very slow drop by drop - even better is to drop it slowly on the surface of the falcon tube
you need to see a sharp interface (together Ficoll+bloodPBS should have 45ml)
E-notebook
[Cebelab2] 2,194,778,120 k of 22,490,480,640 k free
x:\Cebelab_Projects\PJ003_IntracellularClickLabelling*.*
Name
Ext
Size
Date
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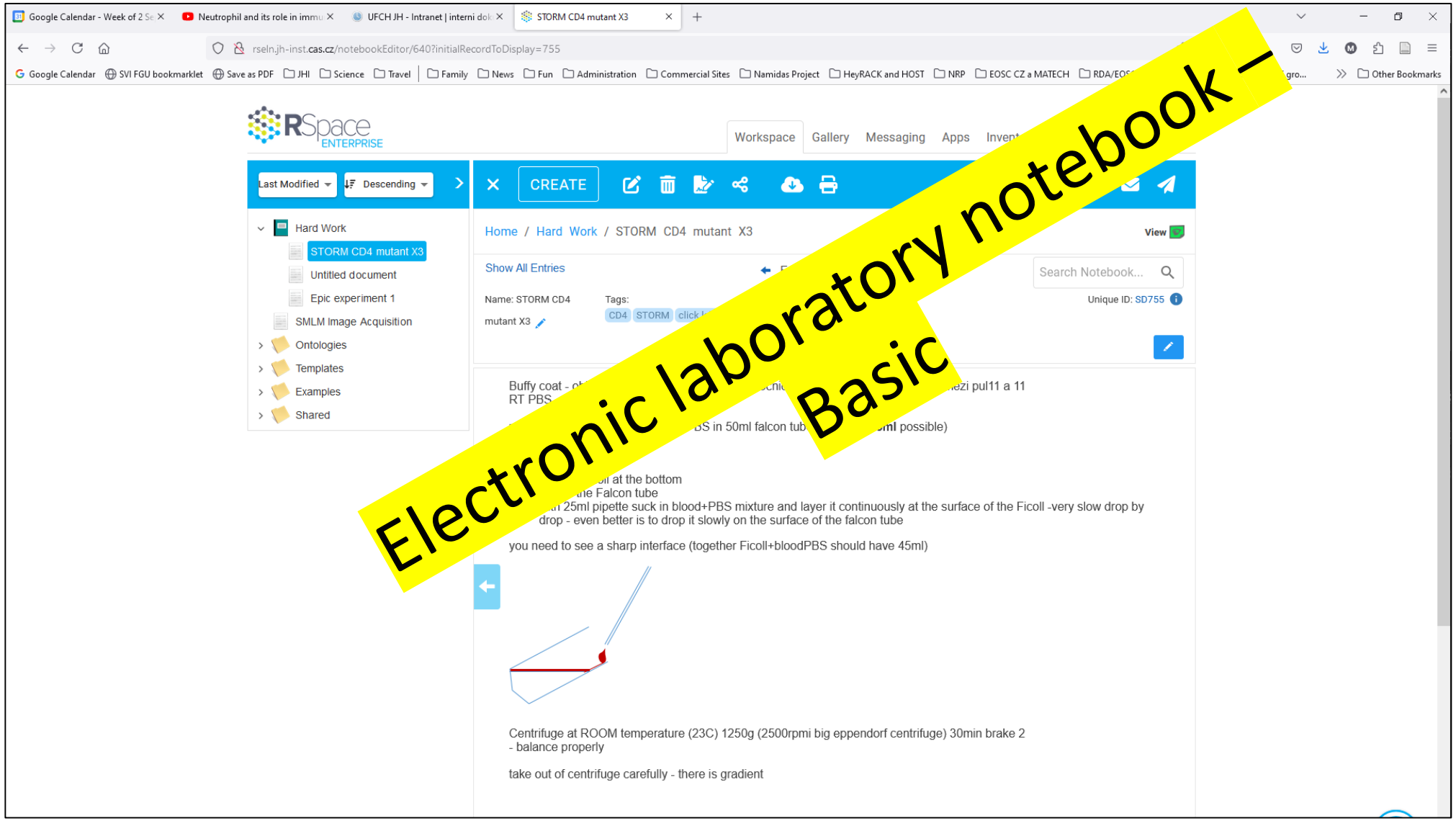
Electronic laboratory notebook – Basic
RSpace ENTERPRISE
Workspace
Gallery
Messaging
Apps
Last Modified
Descending
CREATE
Hard Work
STORM CD4 mutant X3
Untitled document
Epic experiment 1
SMLM Image Acquisition
Ontologies
Templates
Examples
Shared
Home / Hard Work / STORM CD4 mutant X3
View
Show All Entries
Search Notebook...
Name: STORM CD4 mutant X3
Tags:
CD4
STORM
Unique ID: SD755
Buffy coat
RT PBS
you need to see a sharp interface (together Ficoll+bloodPBS should have 45ml)
Centrifuge at ROOM temperature (23C) 1250g (2500rpmi big eppendorf centrifuge) 30min brake 2
- balance properly
take out of centrifuge carefully - there is gradient

Electronic laboratory notebook — For FAIR Data

Kadi4Mat Records Collections Templates Users Groups Quick search

Neutrophils_SMLM_GLY_MPO-DyLight_20240811

dataset

@neutrophils_smlm_gly_mpo-dylight_20240811

Persistent ID: 292

WRITE THE NOTE OF THE EXPERIMENT: What we tried to apply the standard SMLM protocol from our lab for NETs. Objective: preserve the structure of NETs in the coverslips and use it for SMLM with MPO. The main observations are: The coverslips were not moved from the coverslip in which the netosis was induced until the imaging. All the washing steps and incubations with antibodies were in the same plate. Cy5 and DyLinght were tried in glycing coating and MPO as a primary antibody.

Created by **Navarro Jose Alfredo Gonzalez**

Created at August 16, 2024 5:49:48 PM (2 months ago)
Last modified at August 22, 2024 5:17:36 PM (a month ago)

Extra metadata — Hide null values

Name		Dictionary
Name 1	Katerina Paldusova	String
Name 2	Alfredo Gonzalez	String
Date of measurement (Start)	August 9, 2024 12:00:00 AM	Date
Date of measurement (End)	August 11, 2024 12:00:00 AM	
Cell type		
Cell type used	Neutrophils	
Cell count	*null* cells/ml	
Coverslips		
Coverslip Coating	Glycine (2M)	
Coverslip size	25 mm	
Fixation Compound	4% paraformaldehyde	
Antibodies		
Primary antibody	Anti-h	
Primary Incubation time		
Secondary antibody (or streptavidin)		String
Secondary Incubation time		Integer

Neutrophils_S… …MPO-DyLight_20240811 Kadi4Mat

Ne… …LY_MPO-DyLight_20240811

…ylight_20240811

ID: 292

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…bjective: preserve the structure of NETs in the coverslips and use it for SMLM with MPO.
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All the washing steps and incubations with antibodies were in the same plate.
Cy5 and DyLinght were tried in glycing coating and MPO as a primary antibody.

Created by **Navarro Jose Alfredo Gonzalez**

Created at August 16, 2024, 3:49:48 PM UTC

Extra metadata

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Name 2	Alfredo Gonzalez		String
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Date of measurement (End)	August 10, 2024, 10:00:00 PM UTC		Date
Cell type			Dictionary
Cell type used	Neutrophils		String
Cell count	*null*	cells/ml	Integer
Coverslips			Dictionary
Coverslip Coating	Glycine (2M)		String
Coverslip size	25	mm	Integer
Fixation Compound	4% paraformaldehyde		String
Antibodies			Dictionary
Primary antibody	Anti-human MPO-Biotin		String
Primary Incubation time	20	h	Integer
Secondary antibody (or streptavidin)	Streptavidin DyLight 649		String
Secondary Incubation time	2	h	Integer
NETosis Inductor			Dictionary
Inducer name	KATKA PLEASE PUT WHICH BACTERIA		String
Amount	0.0	UNITS	Float
Incubation time	3.0	h	Float
Filter Cube	650LP		String
Lasers			Dictionary
Blue Larser			Dictionary
Blue Larser	true		Boolean
Intensity	10.0	%	Float
Intensity (mV)	*null*	(mV)	Float
Red Laser			Dictionary
Intensity	100.0	%	Float

Generated at October 3, 2024, 7:13:57 AM UTC 1

Kadi4Mat Records Collections Templates Users Groups Quick search

Neutrophils_SMLM_GLY_MPO-DyLight_20240811

dataset

@neutrophils_smlm_gly_mpo-dylight_20240811

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Created at August 16, 2024 5:49:48 PM (2 months ago)
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Coverslips		Dictionary
Coverslip Coating	Glycine (2M)	String
Coverslip size	25 mm	Integer
Fixation Compound	4% paraformaldehyde	String
Antibodies		Dictionary
Primary antibody	Anti-human MPO-Biotin	String
Primary Incubation time	20 h	Integer
Secondary antibody (or streptavidin)	Streptavidin DyLight 649	String
Secondary Incubation time	2 h	Integer

File Edit Selection View Go Run Terminal Help Search

Restricted Mode is intended for safe code browsing. Trust this window to enable all features. Manage Learn More

neutrophils_smlm_gly_mpo-dylight_20240811-extras.json

C: > Users > cebecauer > OneDrive > Scientific Administration > _EOSC_OpenScience_FAIRdata > ELN > ELN_Presentations > neutrophils_smlm_gly_mpo-dylight_20240811-extras.json > ...


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Scientific notebook styles

- Paperback notebook
- Electronic notebook (e-notebook)

  Electronic laboratory (field) notebook – Basic
- Electronic laboratory (field) notebook – For FAIR Data
- Inventory / LIMS

What is ELN?

… definitions …

Imperial College London:

Lab notebooks are a way for researchers to remember vital information about their research through an organised and systematic manner. They may be considered part of your research data and will need to be archived along with your other data.

What is ELN?

… definitions …

Imperial College London:

Easy, real-time collaboration and data sharing. Custom and template experiment records. Protocol library. Version-controlled repository (datasets) ...

What is ELN?

… definitions …

Harvard Medical School:

Some ELNs can also manage inventories of samples, reagents, and other supplies, as well as keeping track of equipment and equipment maintenance schedules (LIMS functions). Additionally, some ELNs provide specialist scientific tools for chemical drawing or molecular biology.

What is ELN?

… definitions …

Research.com:

An ELN can automate many of the manual elements of laboratory note-taking. In laboratory processes, automation simplifies experimental procedures and helps researchers save more time for other tasks such as data analysis. ELNs also use advanced technologies to automate different data input and acquisition processes.

Why to use ELN? … Summary

ELIXIR, RDMkit

Why to use ELN? … Summary

- Records of experiments with relevant annotation and comments – structured/templates/links
- Register of digital objects including digital representations of physical and abstract entities
- Versioning
- Access control to (meta)data. Collaborative functions.
- Protocols/procedures/optional: workflows
- Links to the relevant data
- Optional: Data storage
- Optional: Inventory (samples, supplies, literature, data files)
- Optional: Instrument booking/scheduler
- Optional: Offline functions (electronic field notebook)
- Optional: Timestamps, signatures, witnesses (e.g., legal support)
- Optional: Scientific tools (e.g. data visualisation, schemas)
- Optional: Automatisation of RDM processes

Which is the best solution for my RDM? ELN?

- Avoid ‘one size fits all’ solution
- Personal preferences – it is the principal investigator’s (PI) responsibility to set up RDM processes in a group.
- Provide recommendations and support – help PIs to find the best RDM solution for their team.
- Offer more solutions (ideally diverse) for the RDM in your institution or community.

Find the right ELN for you.

ELN Finder

https://eln-finder.ulb.tu-darmstadt.de/home

Which ELN?

?

- Simple vs. complex
- Commercial vs. open-source
- Institutional instance vs. cloud version
- Does it support the export of FAIRified data? It SHOULD.
- Sharing/collaborative options
- With LIMS vs. w/o LIMS (including scheduler and sample/equipment manager)
- Are specific scientific tools essential/needed?
- Integration with external scientific tools essential/needed?
- Automation?
- Is offline functionality essential/needed?
- Advanced functions: timestamping, signing, witnessing … legal issues.

Selection of ELNs for Heyrovsky Institute (NRP)

- From simple to more complex
- Open-source
- Institutional/national instances
- Must support the export of FAIRified and machine-actionable data?
- Sharing/collaborative options
- With LIMS and w/o LIMS
- Specific scientific tools: non-essential/favourable?
- Advanced functions (timestamping, signing, witnessing …)
- Automatisation processes and access to external services: ready or not?
- Team of developers

Common features

- Creation of user groups and projects
- Access control (individual experiments, collections, (meta)data)
- Mandatory*/Recommended metadata fields
- A panel formats for metadata export (including human and machine-readable formats (PDF, XML, JSON, RDF)
- Customisable templates
- Python scripts/APIs

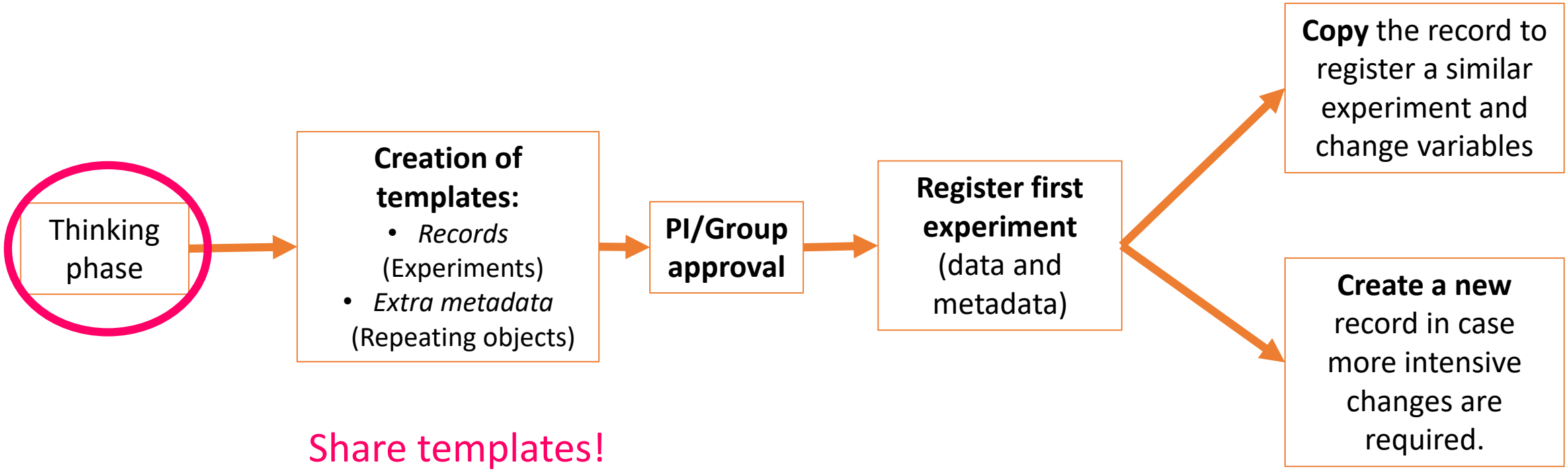
Distinguishing features

- Kadi4Mat: easy to start with, workflows and automation
- eLabFTW: protocols, scheduler, user-friendly
- RSpace: sample management/EOSC integration
- openBIS: professional RDM tool, domain-specific tools

ELN in praxis

How to use ELNs?

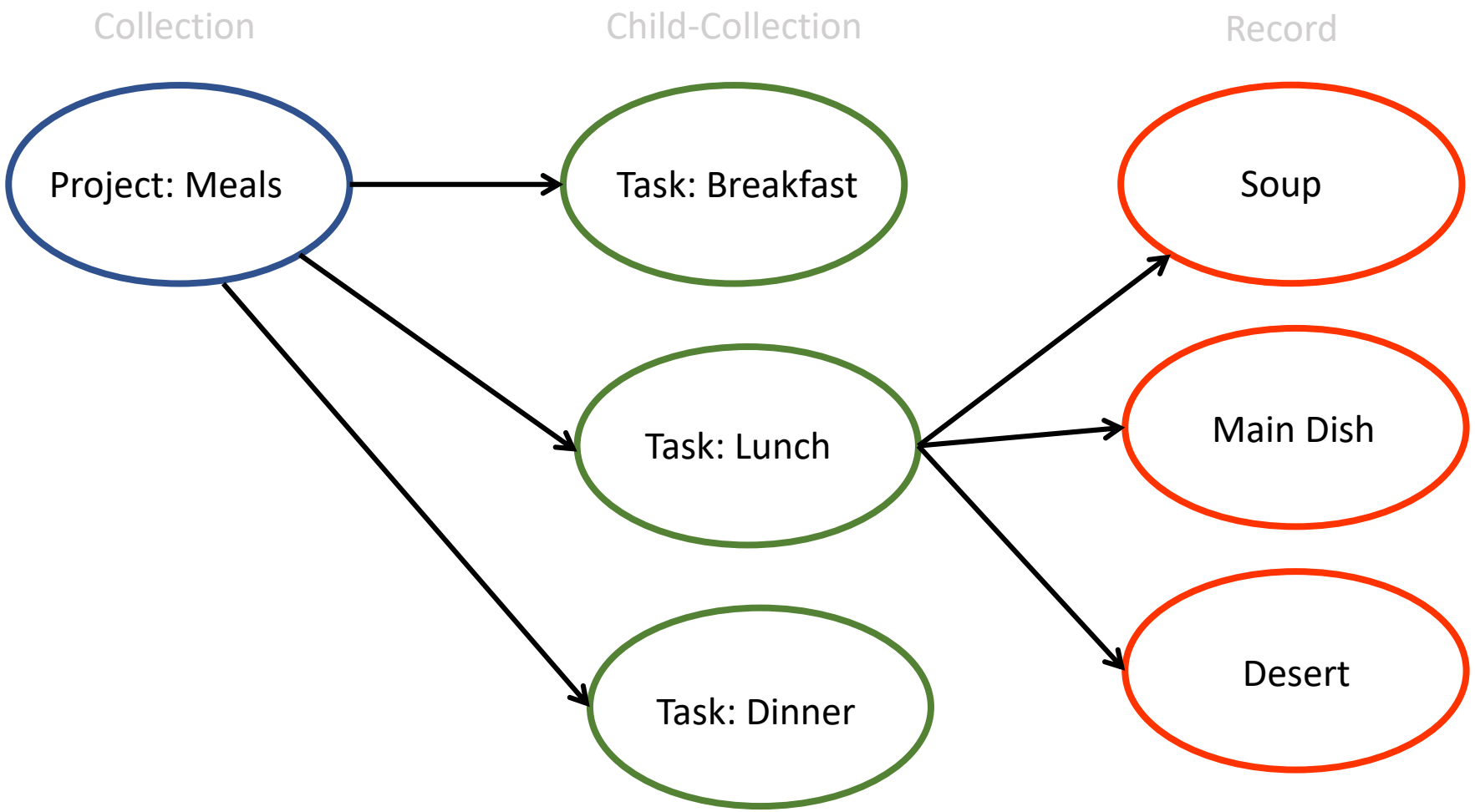
First-time use



Share templates!

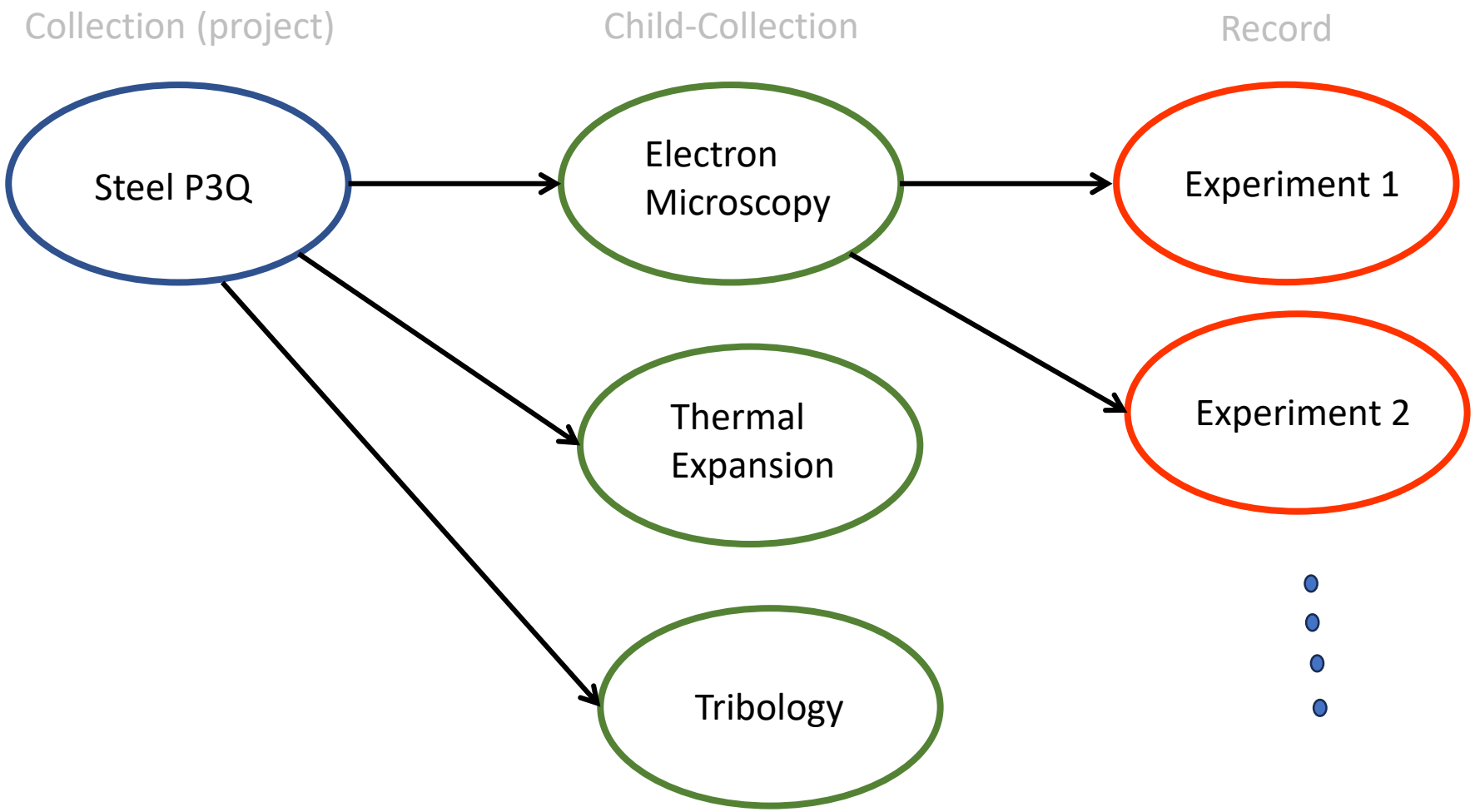
How to use ELNs?

Structure of my project



How to use ELNs?

Structure of my project/collections



Fields in the record – metadata schema

Mandatory

Recommended

Creator — Creator ID …… ORCiD

Owner — Owner ID …… ROR

Date …… Date of the measurement

Sample — Sample ID …… IGSN

Instrument …… Select from the list — Instrument ID …… PIDINST

Temperature …… Integer: range 200-400 K

Pressure …… Integer: value

Record – from template

This editor supports Markdown, including math written in LaTeX syntax rendered with KaTeX. Note that HTML tags and external images are not supported.

Tags

steel ×

An optional list of keywords further describing the record.

Extra metadata

Simple mode | Tree view

Type	Key	Value	Unit
String	Creator	Marek Cebecauer	
String	Creator ID	orcid 5555	
Date	Date of measurement	November 16, 2023 12:00:00 AM	
String	Instrument	JEOL 333	
Integer	Temperature	300	K
String			

+ Add extra

Select a template

License

Search for a license

Specifying an optional license can determine the conditions for the correct reuse of data and metadata when the record is published or simply shared with other users. A license can also be uploaded as a file, in which case one of the "Other" licenses can be chosen.

Visibility

Private

Public visibility automatically grants EVERY logged-in user read permissions for this record.

Czech Academy of Sciences

J. Heyrovský Institute

Thank you for your attention.

marek.cebecauer@jh-inst.cas.cz