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Electronic Laboratory/Field Notebooks (ELN)

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Czech Academy of Sciences

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MINISTRY OF EDUCATION, YOUTH AND SPORTS

MUNI ICS

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Czech Academy of Sciences

J. Heyrovský Institute

Outline

- What is an electronic laboratory/field notebook – ELN?
- Why to use ELN?
- Which ELN is good for me?
- Comparison of selected ELNs
- Examples of use
- Questions/Discussion

Routine abbreviations

- Electronic laboratory (field) notebook (ELN)
- Laboratory Information Management System (LIMS)
- Research Data Management (RDM)
- National Repository Platform (NRP)
- FAIR principles …. Findable, accessible, interoperable, reusable
- Machine-actionable (MA)

Scientific notebook styles

- Paperback notebook
- Electronic notebook (e-notebook)
- Electronic laboratory (field) notebook – standard
- Electronic laboratory (field) notebook – advanced
- Inventory / LIMS

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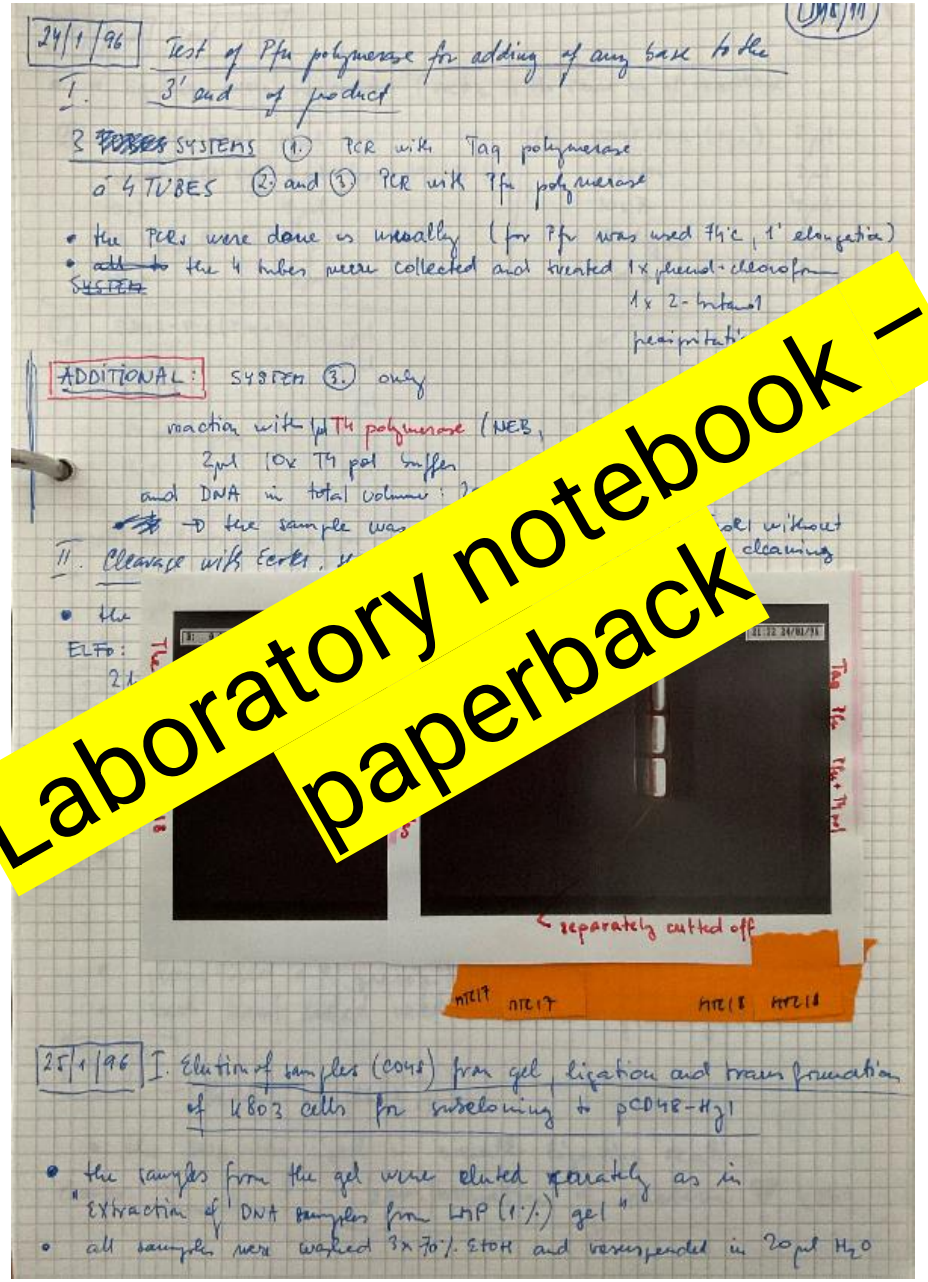
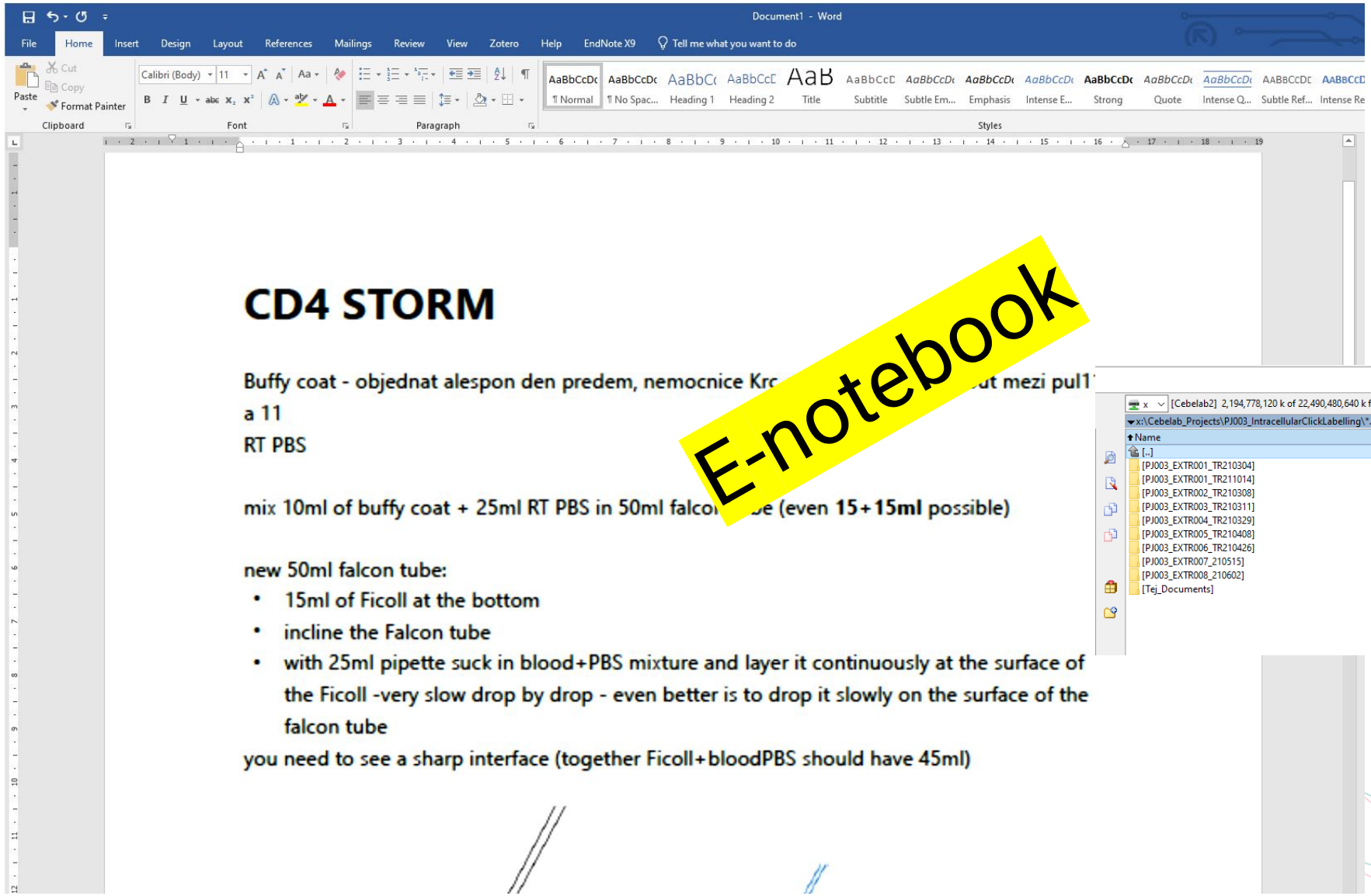


Laboratory notebook – paperback


Document1 - Word
File Home Insert Design Layout References Mailings Review View Zotero Help EndNote X9 Tell me what you want to do
Paste Cut Copy Format Painter
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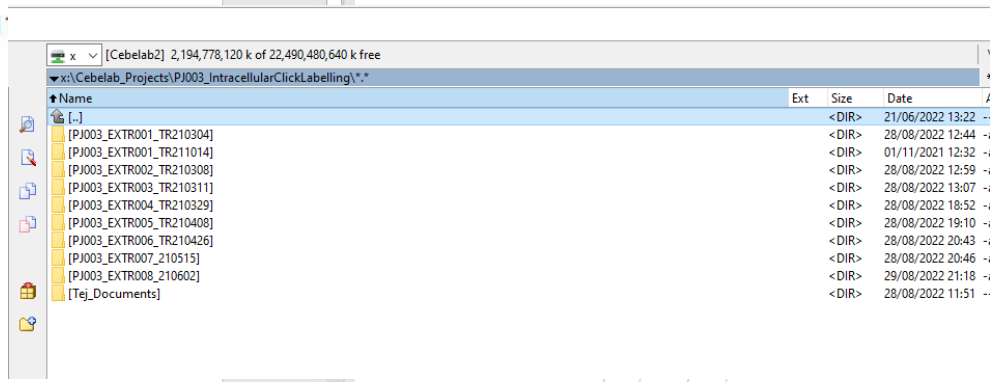
CD4 STORM
Buffy coat - objednat alespon den predem, nemocnice Kr
ut mezi pul1
a 11
RT PBS
mix 10ml of buffy coat + 25ml RT PBS in 50ml falco
e (even 15+15ml possible)
new 50ml falcon tube:
15ml of Ficoll at the bottom
incline the Falcon tube
with 25ml pipette suck in blood+PBS mixture and layer it continuously 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
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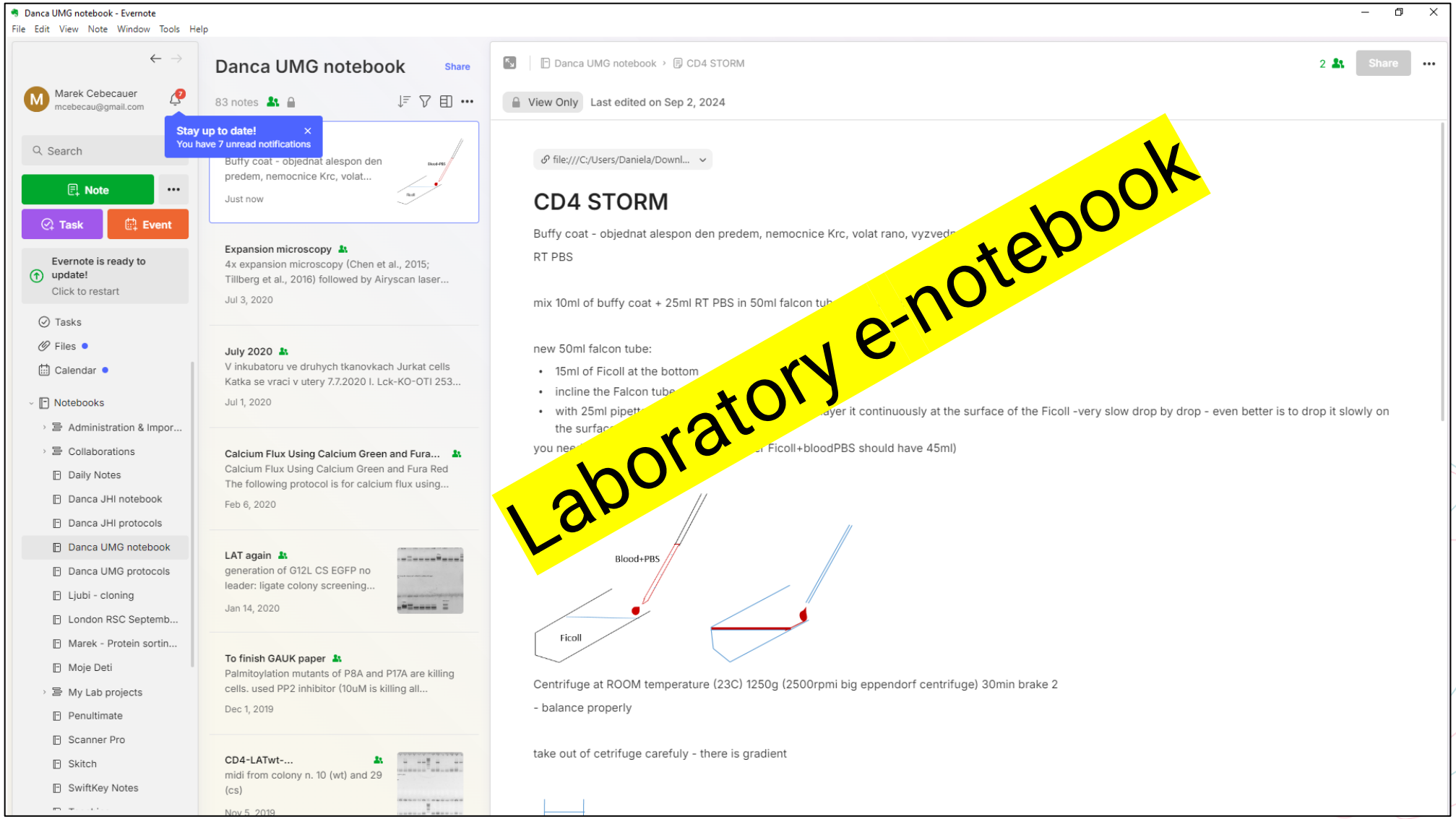
Danca UMG notebook - Evernote
File Edit View Note Window Tools Help
Danca UMG notebook
Share
83 notes
Marek Cebecauer
mcebecau@gmail.com
Stay up to date!
You have 7 unread notifications
Search
Note
Task
Event
Evernote is ready to update!
Click to restart
Tasks
Files
Calendar
Notebooks
Administration & Impor...
Collaborations
Daily Notes
Danca JHI notebook
Danca JHI protocols
Danca UMG notebook
Danca UMG protocols
Ljubi - cloning
London RSC Septemb...
Marek - Protein sortin...
Moje Deti
My Lab projects
Penultimate
Scanner Pro
Skitch
SwiftKey Notes
Buffy coat - objednat alespon den predem, nemocnice Krc, volat...
Just now
Expansion microscopy
4x expansion microscopy (Chen et al., 2015; Tillberg et al., 2016) followed by Airyscan laser...
Jul 3, 2020
July 2020
V inkubatoru ve druhych tkanovkach Jurkat cells Katka se vraci v utery 7.7.2020 I. Lck-KO-OTI 253...
Jul 1, 2020
Calcium Flux Using Calcium Green and Fura...
Calcium Flux Using Calcium Green and Fura Red The following protocol is for calcium flux using...
Feb 6, 2020
LAT again
generation of G12L CS EGFP no leader: ligate colony screening...
Jan 14, 2020
To finish GAUK paper
Palmitoylation mutants of P8A and P17A are killing cells. used PP2 inhibitor (10uM is killing all...
Dec 1, 2019
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Nov 5, 2019
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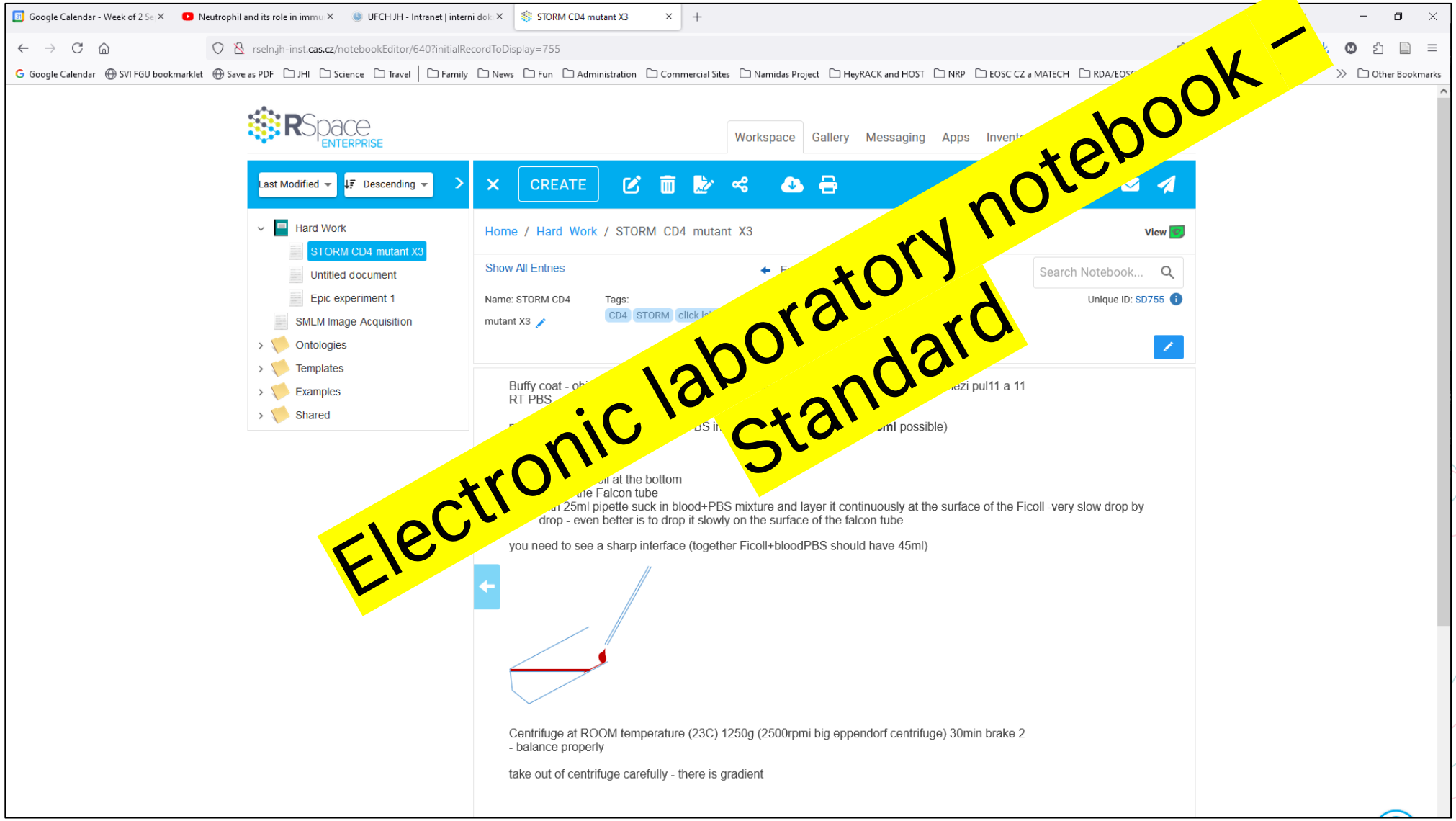
CD4 STORM
Buffy coat - objednat alespon den predem, nemocnice Krc, volat rano, vyzved
RT PBS
mix 10ml of buffy coat + 25ml RT PBS in 50ml falcon tub
new 50ml falcon tube:
15ml of Ficoll at the bottom
incline the Falcon tube
with 25ml pipett
ayer it continuously at the surface of the Ficoll -very slow drop by drop - even better is to drop it slowly on the surfac
you nee
Ficoll+bloodPBS should have 45ml)
Blood+PBS
Ficoll
Centrifuge at ROOM temperature (23C) 1250g (2500rpmi big eppendorf centrifuge) 30min brake 2
- balance properly
take out of cetrifuge carefuly - there is gradient
Laboratory e-notebook


Electronic laboratory notebook – Standard
STORM CD4 mutant X3
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RSpace ENTERPRISE
Workspace
Gallery
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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 - ob
RT PBS
ml possible)
at the bottom
the Falcon tube
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
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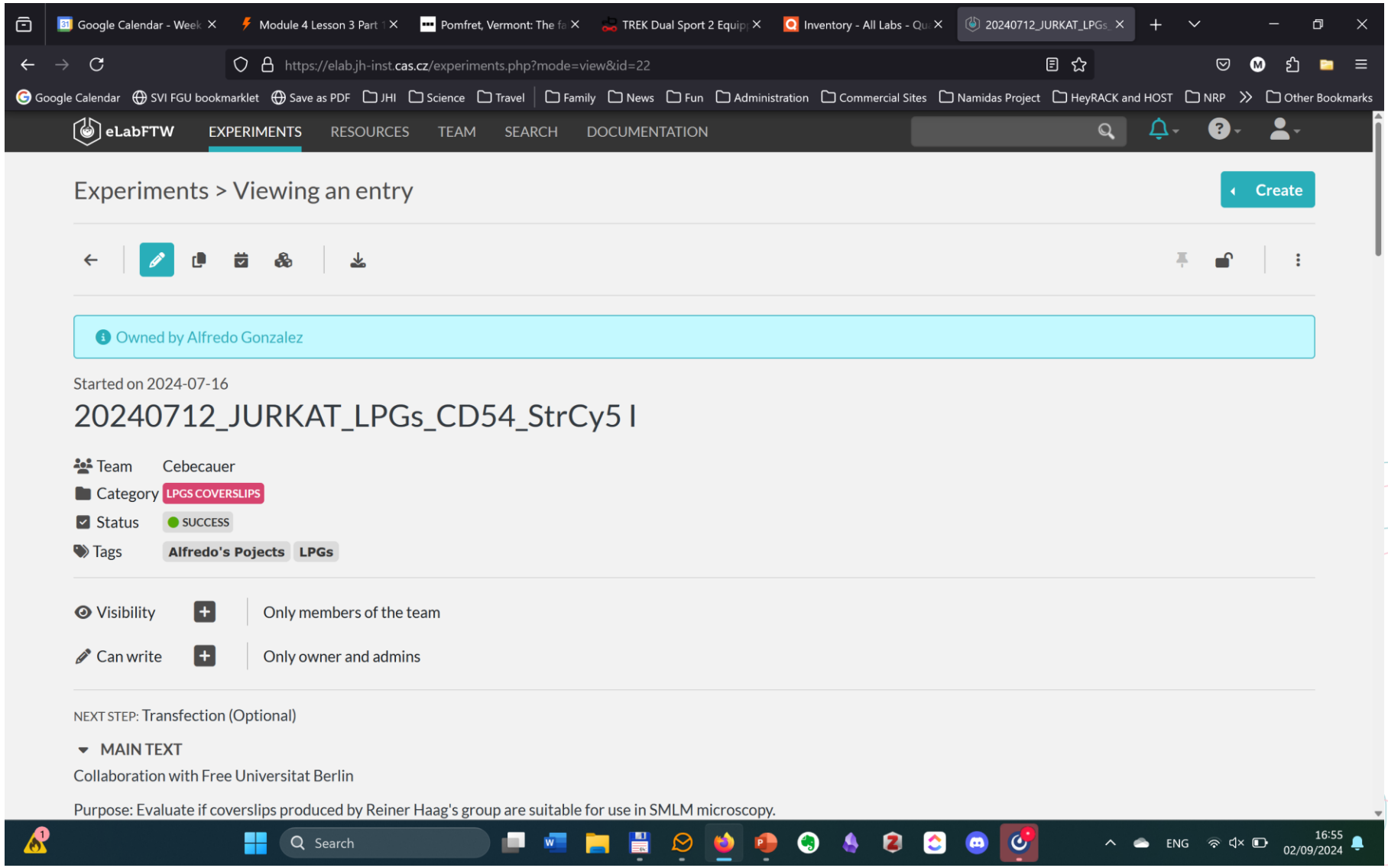
take out of centrifuge carefully - there is gradient


Google Calendar - Week
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TREK Dual Sport 2 Equip
Inventory - All Labs - Qu
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SVI FGU bookmarklet
Save as PDF
JHI
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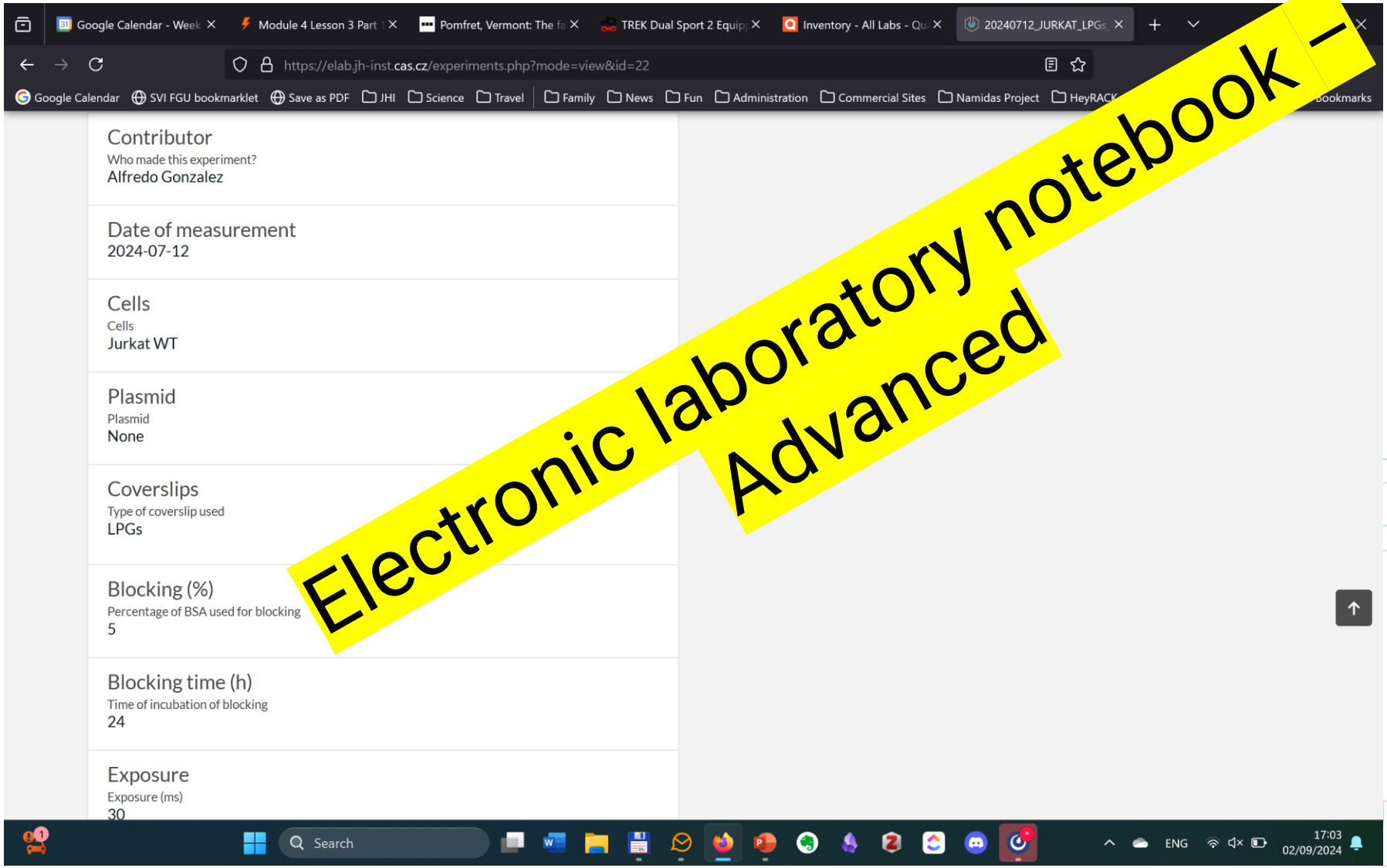
Travel
Family
News
Fun
Administration
Commercial Sites
Namidas Project
HeyRACK and HOST
NRP
Other Bookmarks
eLabFTW
EXPERIMENTS
RESOURCES
TEAM
SEARCH
DOCUMENTATION
Experiments > Viewing an entry
Create
Owned by Alfredo Gonzalez
Started on 2024-07-16
20240712_JURKAT_LPGs_CD54_StrCy5 I
Team Cebecauer
Category LPGS COVERSLIPS
Status SUCCESS
Tags Alfredo's Pojects LPGs
Visibility
Only members of the team
Can write
Only owner and admins
NEXT STEP: Transfection (Optional)
MAIN TEXT
Collaboration with Free Universitat Berlin
Purpose: Evaluate if coverslips produced by Reiner Haag's group are suitable for use in SMLM microscopy.
Search
ENG
16:55
02/09/2024


Google Calendar - Week
Module 4 Lesson 3 Part
Pomfret, Vermont: The
TREK Dual Sport 2 Equip
Inventory - All Labs - Qu
20240712_JURKAT_LPGs
https://elab.jh-inst.cas.cz/experiments.php?mode=view&id=22
Google Calendar
SVI FGU bookmarklet
Save as PDF
JHI
Science
Travel
Family
News
Fun
Administration
Commercial Sites
Namidas Project
HeyRACK
Bookmarks
Contributor
Who made this experiment?
Alfredo Gonzalez
Date of measurement
2024-07-12
Cells
Cells
Jurkat WT
Plasmid
Plasmid
None
Coverslips
Type of coverslip used
LPGs
Blocking (%)
Percentage of BSA used for blocking
5
Blocking time (h)
Time of incubation of blocking
24
Exposure
Exposure (ms)
30
Electronic laboratory notebook – Advanced
Search
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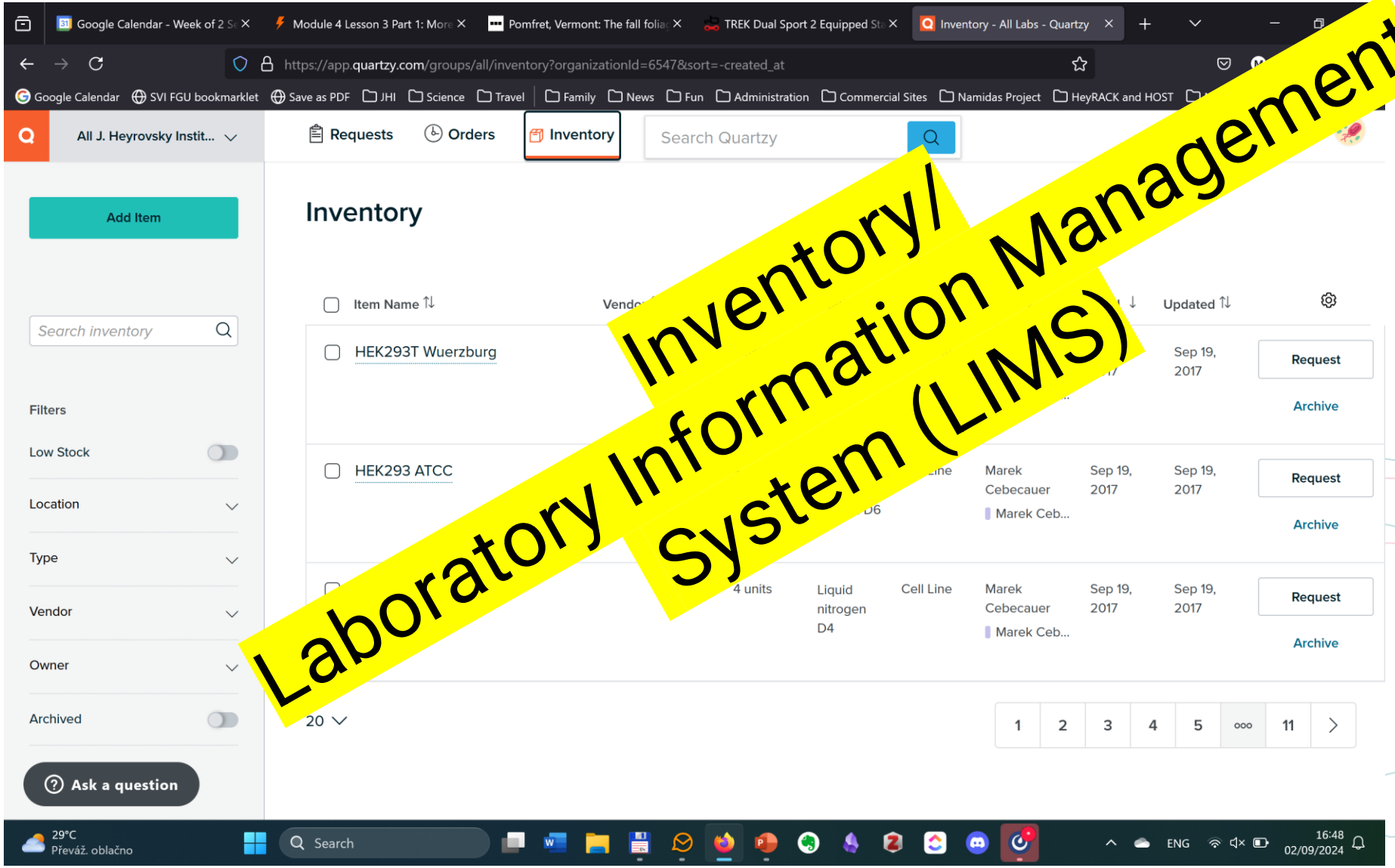
02/09/2024


Inventory/
Laboratory Information Management
System (LIMS)
Inventory - All Labs - Quartzy
https://app.quartzy.com/groups/all/inventory?organizationId=6547&sort=-created_at
All J. Heyrovsky Instit...
Requests
Orders
Inventory
Search Quartzy
Add Item
Search inventory
Filters
Low Stock
Location
Type
Vendor
Owner
Archived
Ask a question
Inventory
Item Name
Updated
HEK293T Wuerzburg
Sep 19, 2017
Request
Archive
HEK293 ATCC
Marek Cebecauer
Sep 19, 2017
Sep 19, 2017
Request
Archive
4 units
Liquid nitrogen D4
Cell Line
Marek Cebecauer
Sep 19, 2017
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02/09/2024

Scientific notebook styles

- Paperback notebook
- Electronic notebook (e-notebook)
- Electronic laboratory (field) notebook – standard
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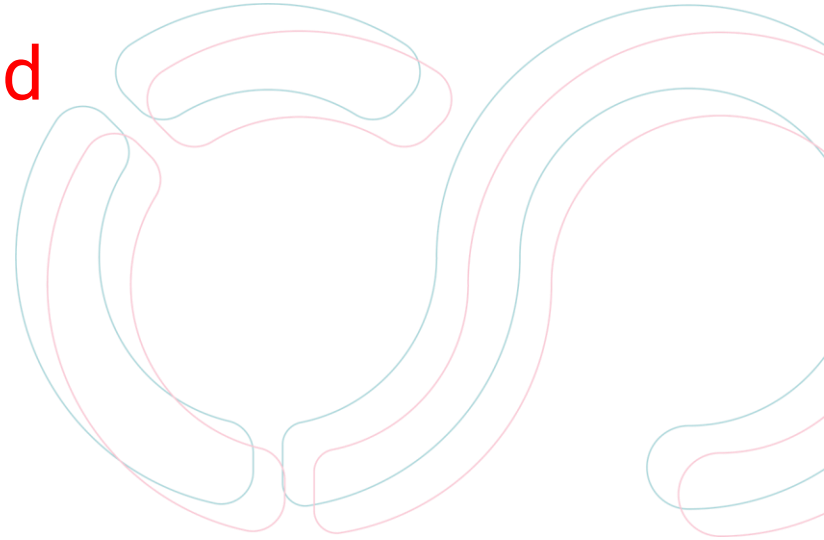
- Inventory / LIMS



What is ELN?

… definitions …

Harvard Medical School:

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

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

- 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/workflows
- Links to the relevant data
- Optional: Data storage
- Optional: Inventory (samples, supplies, literature, data files)
- Optional: Instrument booking/scheduler
- Optional: Offline functions (electronic filed notebook)
- Optional: Timestamps (e.g., legal support)
- Optional: Signatures/witnesses
- Optional: Scientific tools (e.g. data visualisation, schemas)
- Optional: Automatisation of RDM processes

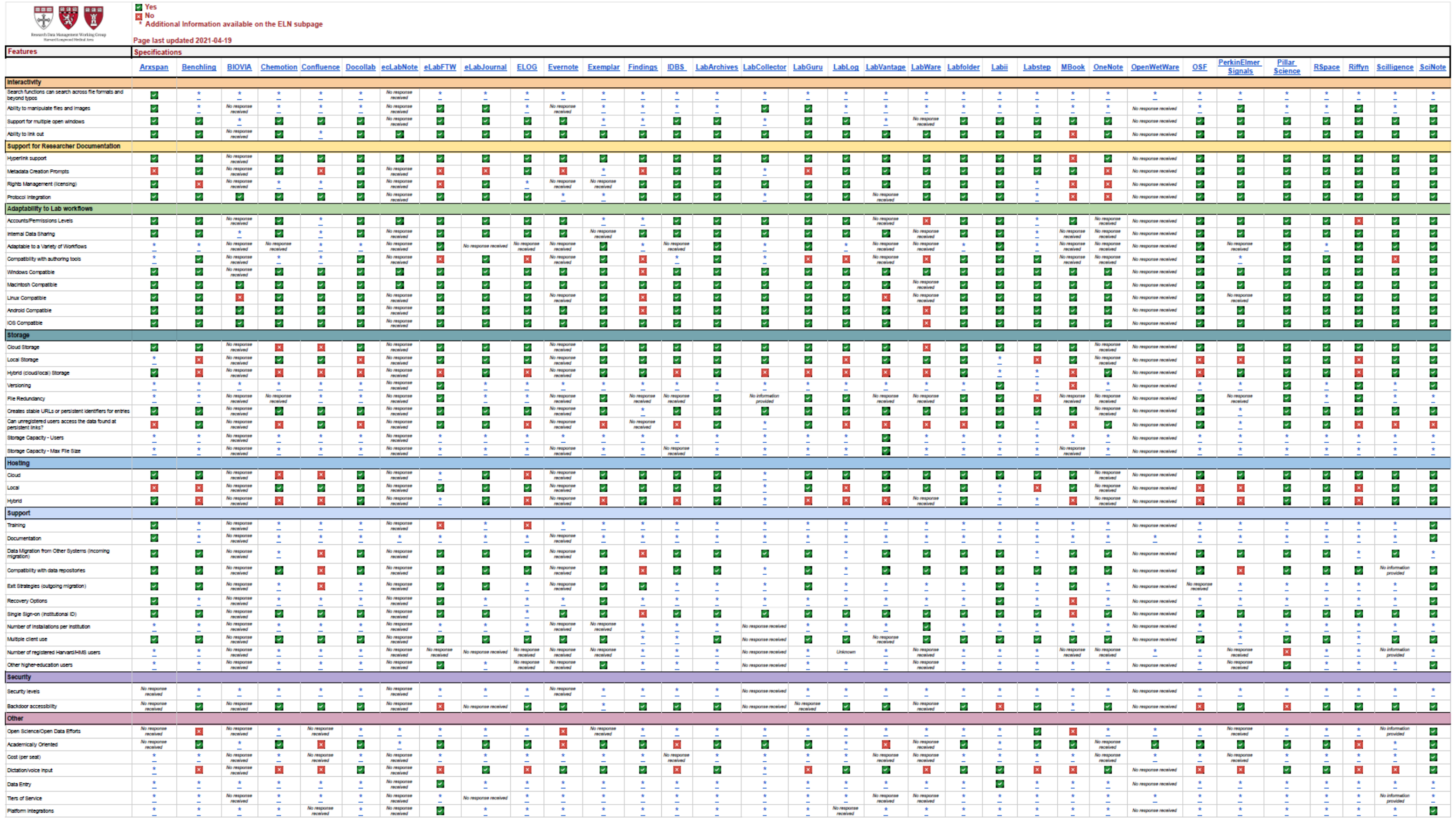
Why to use ELN? … Summary

ELIXIR, RDMkit

Which ELN?

- Avoid ‘one size fits all’ solution
- Personal preferences – the principal investigator’s (PI) responsibility
- Provide recommendations and support – the PIs have to make the decision whether to use ELN or other tools.
- Offer more solutions (ideally diverse) for the RDM in your institution

120 ELN solutions (or more)



10.5281/zenodo.4723752

Find the right ELN for you.

ELN Finder

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

https://research.com/software/best-eln-software

RDM tool selection/Which ELN?

- Simple vs. complex
- Commercial vs. open-source
- Institutional instance vs. cloud version
- Does it support the export of FAIRified data?
- 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?
- Is offline functionality essential/needed?
- Advanced functions: timestamping, signing, witnessing … legal issues.

Selection of ELNs for NRP/MATECH

- 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?
- Offline functionality: non-essential/favourable (expenses)?
- Optional: Advanced functions (timestamping, signing, witnessing …)
- Automatisation processes: ready or not?
- Team of developers

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Kadi4Mat

Simple ELN for NRP/MATECH

- Basic functionalities: Records, Collections, Groups, Templates
- Open-source
- Easy to install and maintain institutional instances
- Supports the export of FAIRified/MA data: RO-Crate, RDF, JSON
- Sharing/collaborative options - limited
- No extra LIMS functions
- No additional scientific tools: as off Sept 2024
- Offline functionality: NO
- Advanced functions: Publishing in ZENODO (simplistic version ☺), workflows
- Prepared for automatisation: YES, advanced
- Prepared for integration with external scientific tools: YES, very advanced

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Intermediate ELN for NRP/MATECH

eLabFTW

- Basic functionalities: Projects, Experiments, Users, Protocols, Templates
- Open-source
- Standard installation and maintenance of institutional instances
- Supports the export of FAIRified/MA data: RO-Crate (ELN), JSON
- Sharing/collaborative options – within an instance
- Limited LIMS functions, equipment registry and booking
- Specific scientific tools: drawing chemical structures
- Offline functionality: NO
- Advanced functions: scheduler (calendar), timestamping (legally: extra charge)
- Prepared for automatisation: Partially
- Prepared for integration with external scientific tools: Limited

Complex ELN for NRP/MATECH I.

openBIS

- Functionalities: Spaces/users, Projects, Objects, Protocols, Publications, Templates
- Open-source
- Standard installation and maintenance of institutional instances
- Supports the export of FAIRified/MA data: JSON
- Sharing/collaborative options – supported
- Advanced LIMS
- Specific scientific tools: molecular biology tools, big data, …
- Offline functionality: NO
- Advanced functions: publish to ZENODO, scheduler (calendar), timestamping (extra charge)
- Prepared for automatisation: YES
- Prepared for integration with external scientific tools: YES, very advanced

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Complex ELN for NRP/MATECH II.

- Basic functionalities: Notebooks, Experiments, Users/Groups, Forms and Templates
- Open-source (from July 1, 2024)
- Standard installation and maintenance of institutional instances
- Supports the export of FAIRified/MA data: RO-Crate (ELN), XML
- Sharing/collaborative options – within an instance
- Advanced LIMS, including IGSN registration
- Specific scientific tools: extensive integration with RDM tools, chemical structures
- Offline functionality: NO
- Advanced functions: scheduler (calendar), signing/witnessing, Dataverse and Protocols.io integration
- Prepared for automatisation: ??
- Prepared for integration with external scientific tools: YES

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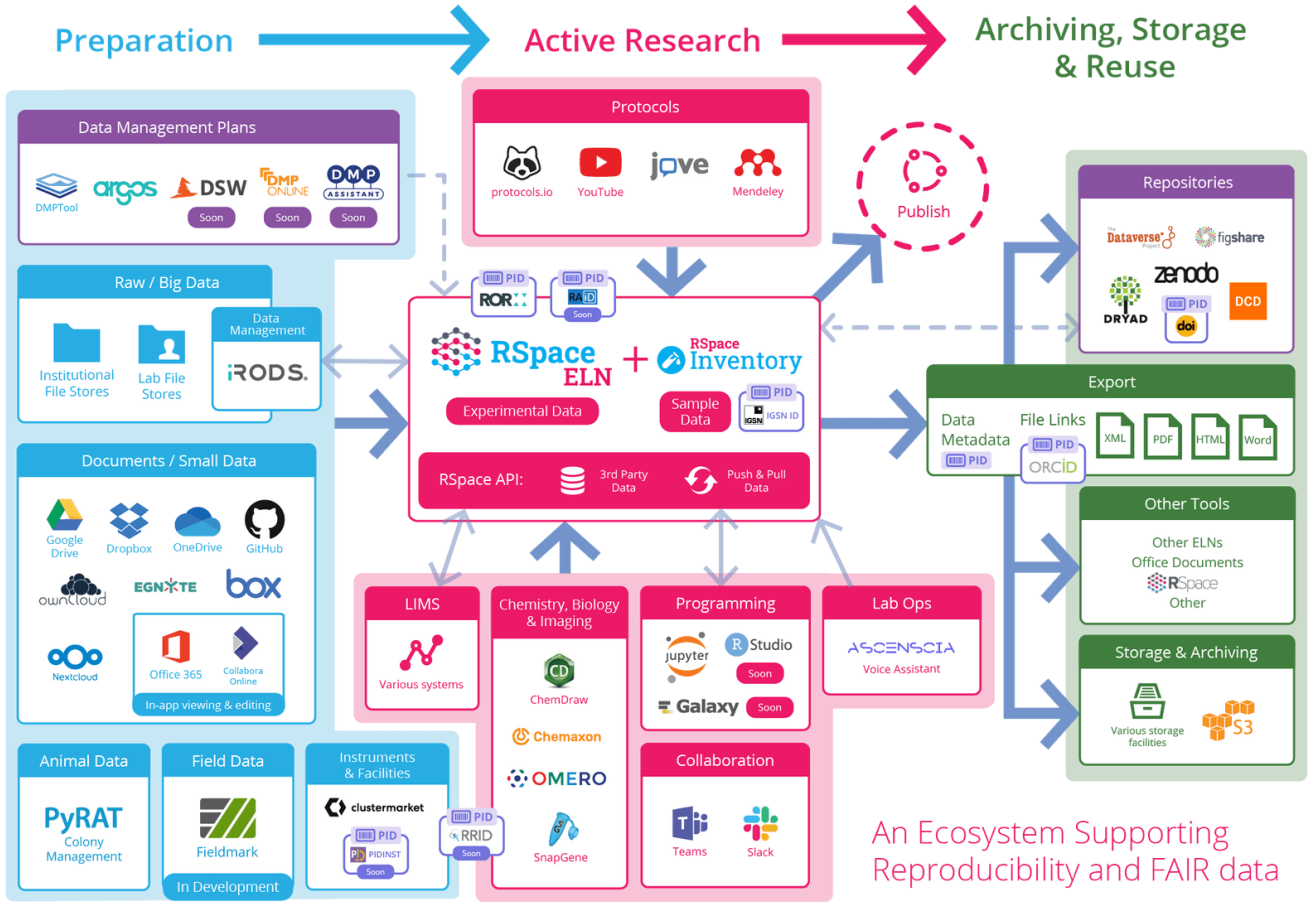
Complex ELN for NRP/MATECH II.



Common features

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

Distinguishing features – focusing on ?

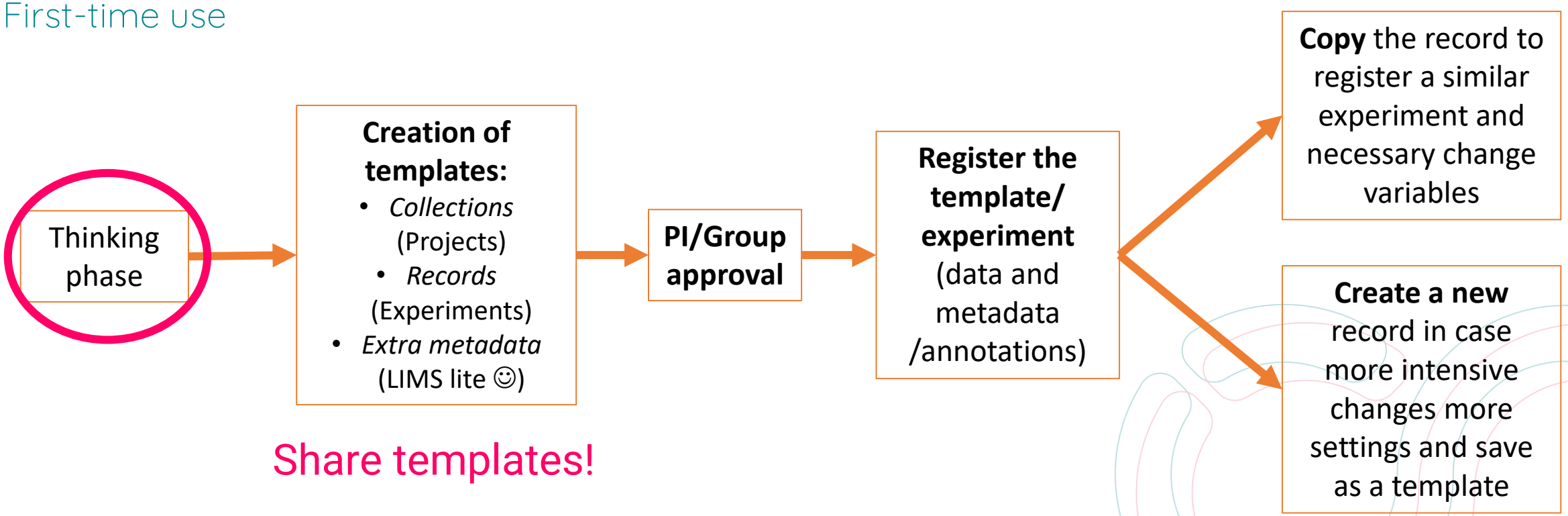
- Kadi4Mat: simple, workflows
- eLabFTW: protocols, scheduler
- RSpace: sample management/EOSC integration
- openBIS: professional RDM tool, domain-specific tools

- FAIMS3/Fieldmark: electronic field notebook – offline functionality

ELN in praxis

How to use ELNs?

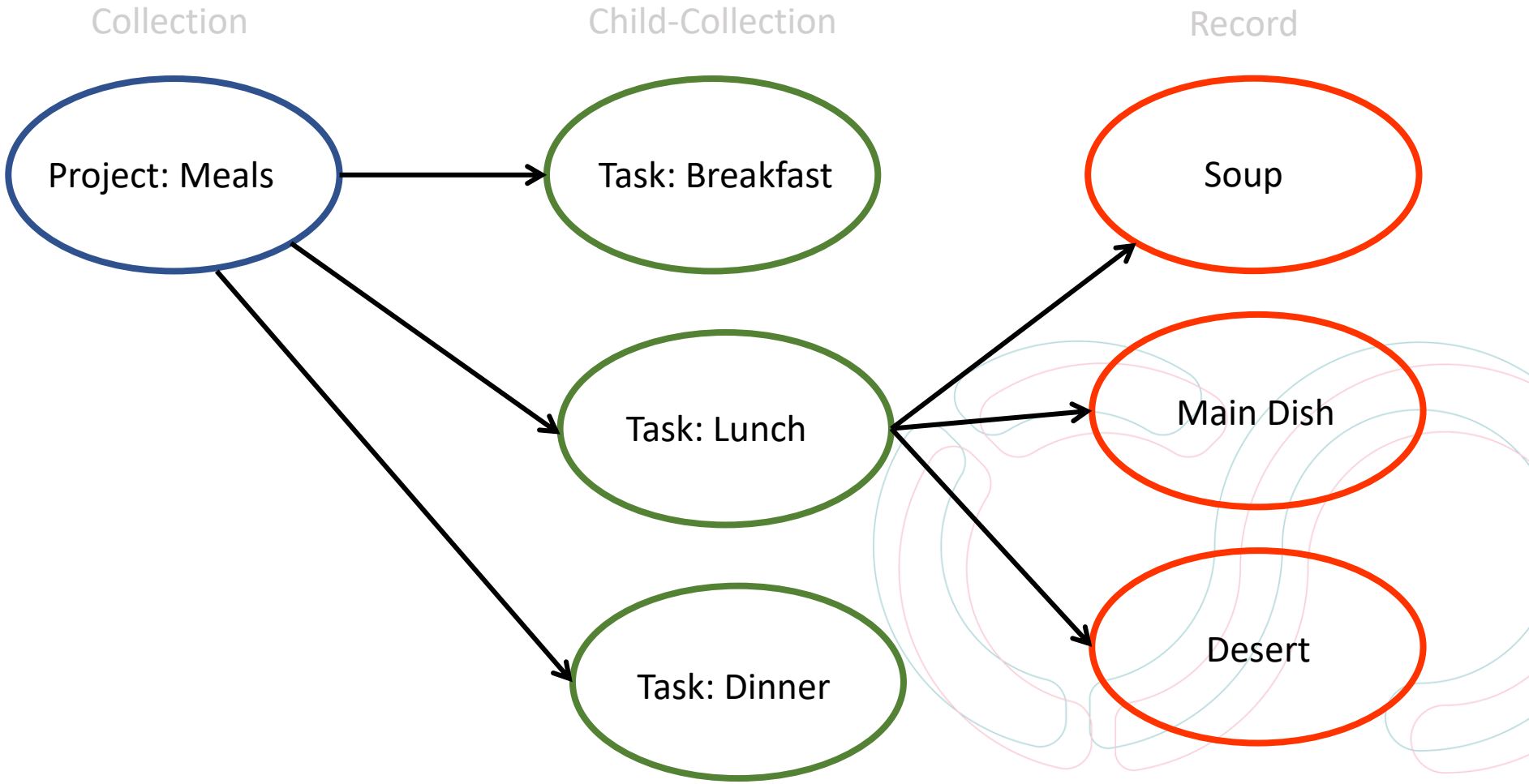
First-time use



Share templates!

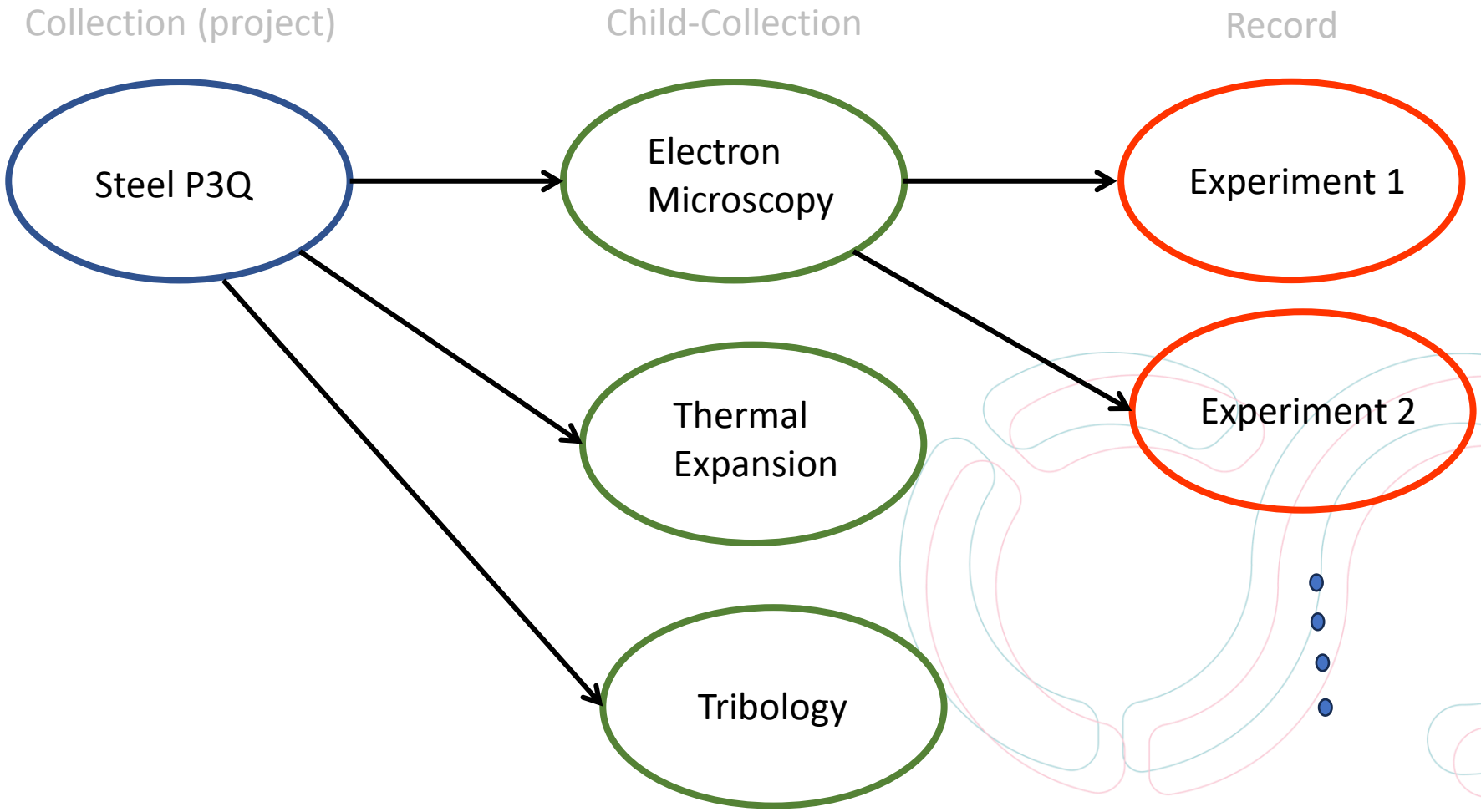
How to use ELNs?

Structure of my project



How to use ELNs?

Structure of my project



Fields in the record – metadata schema

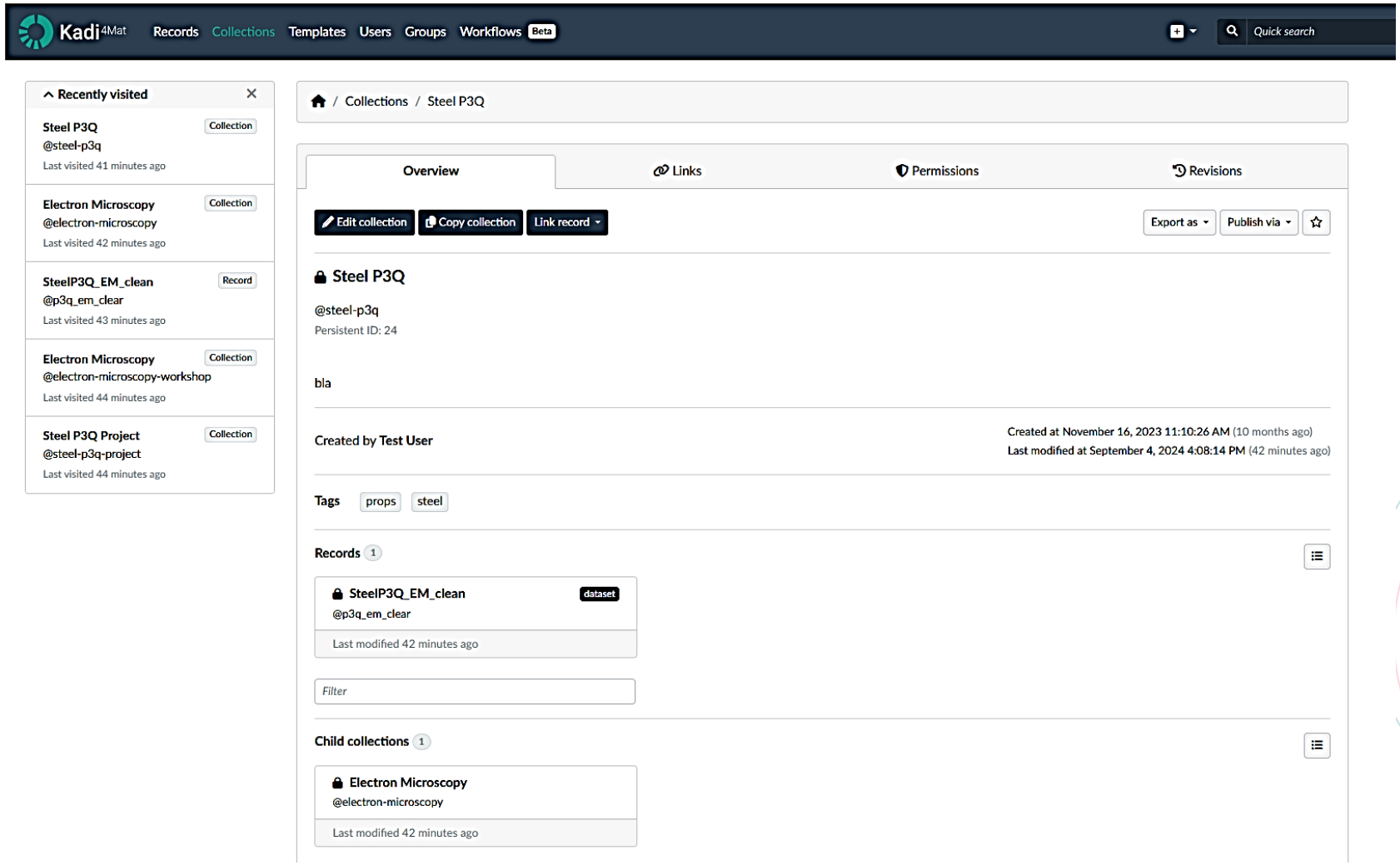
Mandatory

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

Live demo

Collection


Kadi4Mat
Records
Collections
Templates
Users
Groups
Workflows
Beta
Quick search
Recently visited
Steel P3Q
Collection
@steel-p3q
Last visited 41 minutes ago
Electron Microscopy
Collection
@electron-microscopy
Last visited 42 minutes ago
SteelP3Q_EM_clean
Record
@p3q_em_clear
Last visited 43 minutes ago
Electron Microscopy
Collection
@electron-microscopy-workshop
Last visited 44 minutes ago
Steel P3Q Project
Collection
@steel-p3q-project
Last visited 44 minutes ago
/ Collections / Steel P3Q
Overview
Links
Permissions
Revisions
Edit collection
Copy collection
Link record
Export as
Publish via
Steel P3Q
@steel-p3q
Persistent ID: 24
bla
Created by Test User
Created at November 16, 2023 11:10:26 AM (10 months ago)
Last modified at September 4, 2024 4:08:14 PM (42 minutes ago)
Tags
props
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Records 1
SteelP3Q_EM_clean
dataset
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Last modified 42 minutes ago
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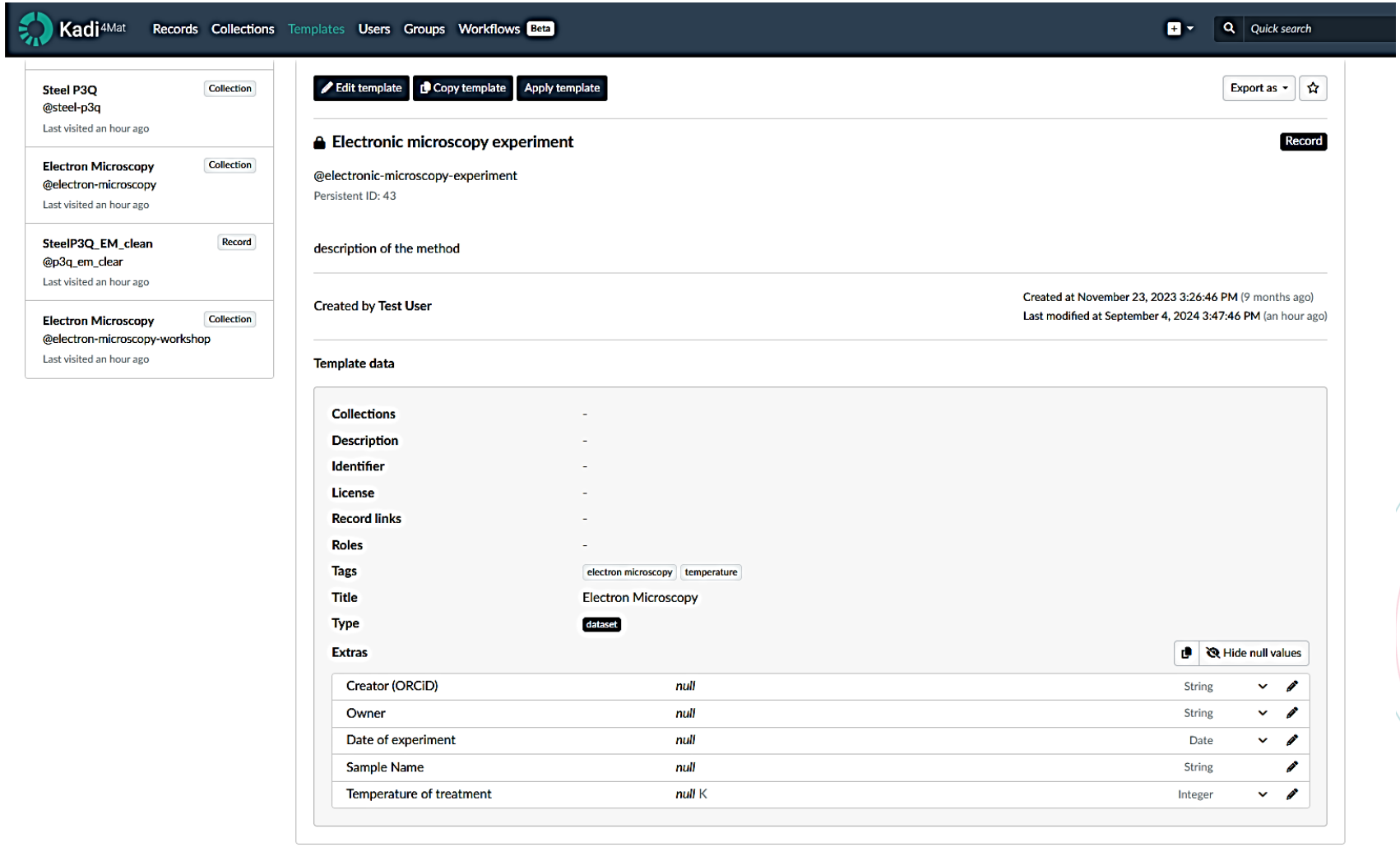
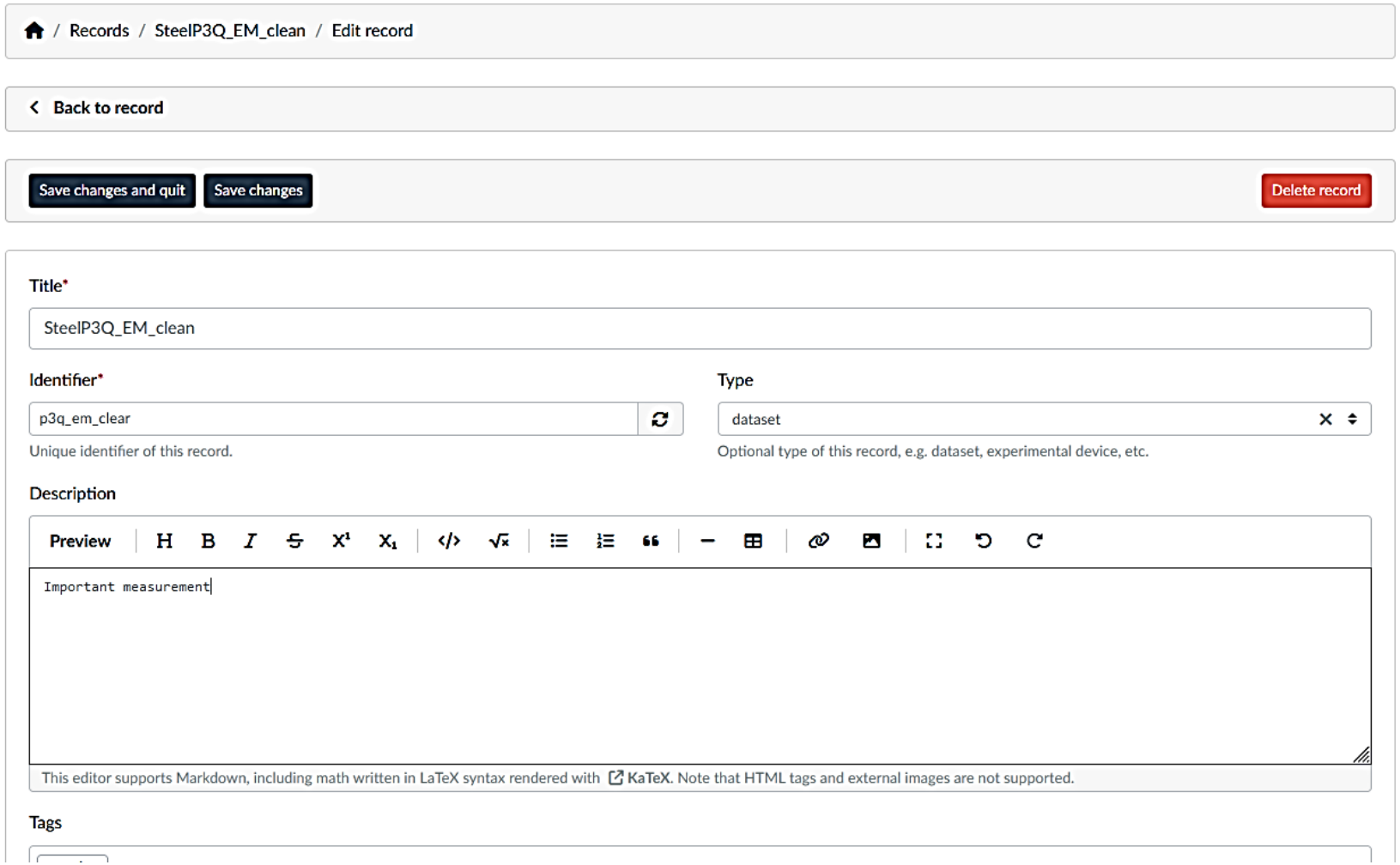
Child collections 1
Electron Microscopy
@electron-microscopy
Last modified 42 minutes ago

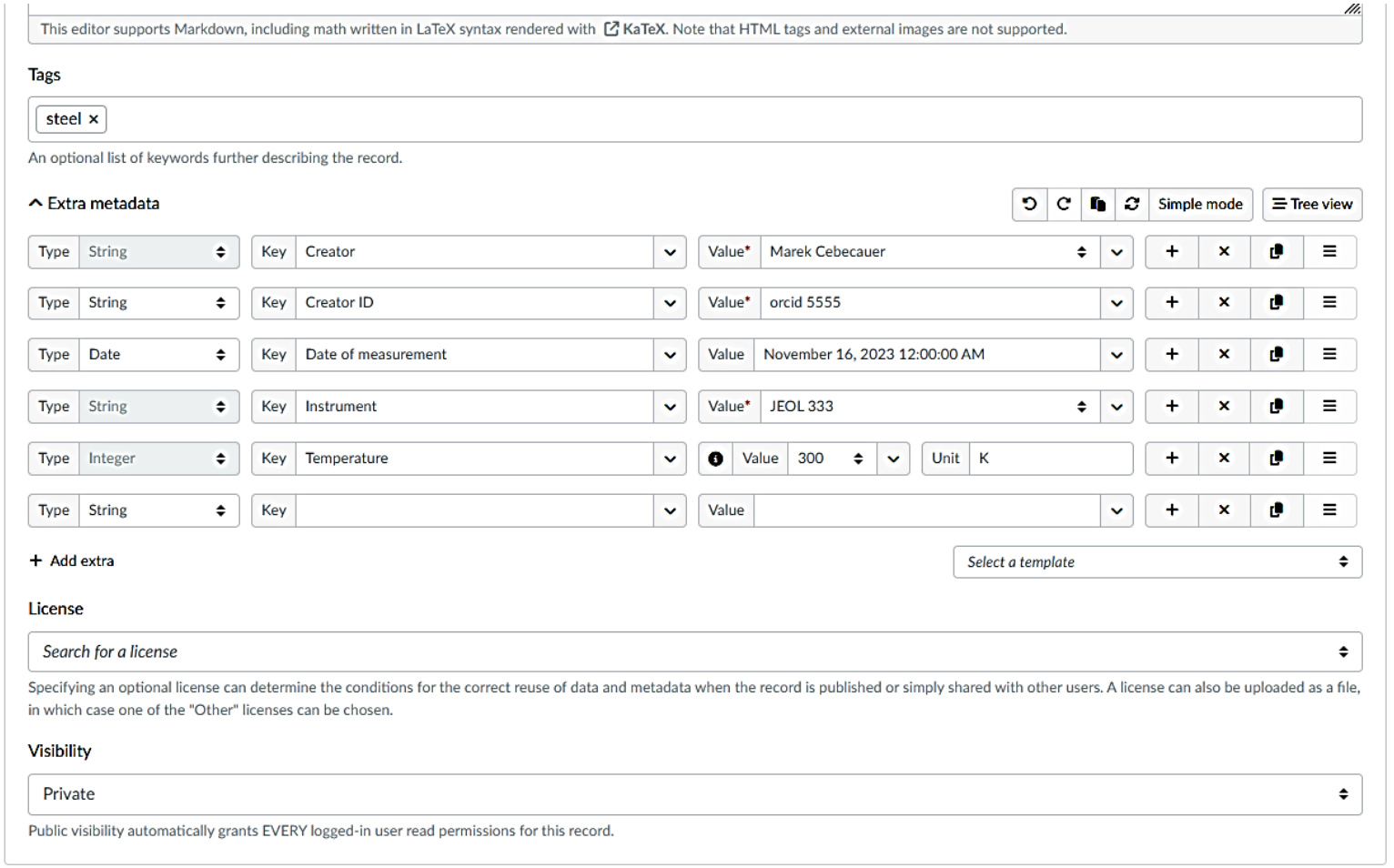
Template


Kadi4Mat
Records
Collections
Templates
Users
Groups
Workflows
Beta
Quick search
Steel P3Q
@steel-p3q
Last visited an hour ago
Collection
Electron Microscopy
@electron-microscopy
Last visited an hour ago
Collection
SteelP3Q_EM_clean
@p3q_em_clear
Last visited an hour ago
Record
Electron Microscopy
@electron-microscopy-workshop
Last visited an hour ago
Collection
Edit template
Copy template
Apply template
Export as
Electronic microscopy experiment
Record
@electronic-microscopy-experiment
Persistent ID: 43
description of the method
Created by Test User
Created at November 23, 2023 3:26:46 PM (9 months ago)
Last modified at September 4, 2024 3:47:46 PM (an hour ago)
Template data
Collections -
Description -
Identifier -
License -
Record links -
Roles -
Tags electron microscopy temperature
Title Electron Microscopy
Type dataset
Extras
Hide null values
Creator (ORCiD) null String
Owner null String
Date of experiment null Date
Sample Name null String
Temperature of treatment null K Integer

Record


/ Records / SteelP3Q_EM_clean / Edit record
Back to record
Save changes and quit
Save changes
Delete record
Title*
SteelP3Q_EM_clean
Identifier*
p3q_em_clear
Unique identifier of this record.
Type
dataset
Optional type of this record, e.g. dataset, experimental device, etc.
Description
Preview
Important measurement
This editor supports Markdown, including math written in LaTeX syntax rendered with KaTeX. Note that HTML tags and external images are not supported.
Tags

Record – from template



Discussion

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Thank you for your attention.

marek.cebecauer@jh-inst.cas.cz

Co-funded by the European Union

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