Plasma-MDS

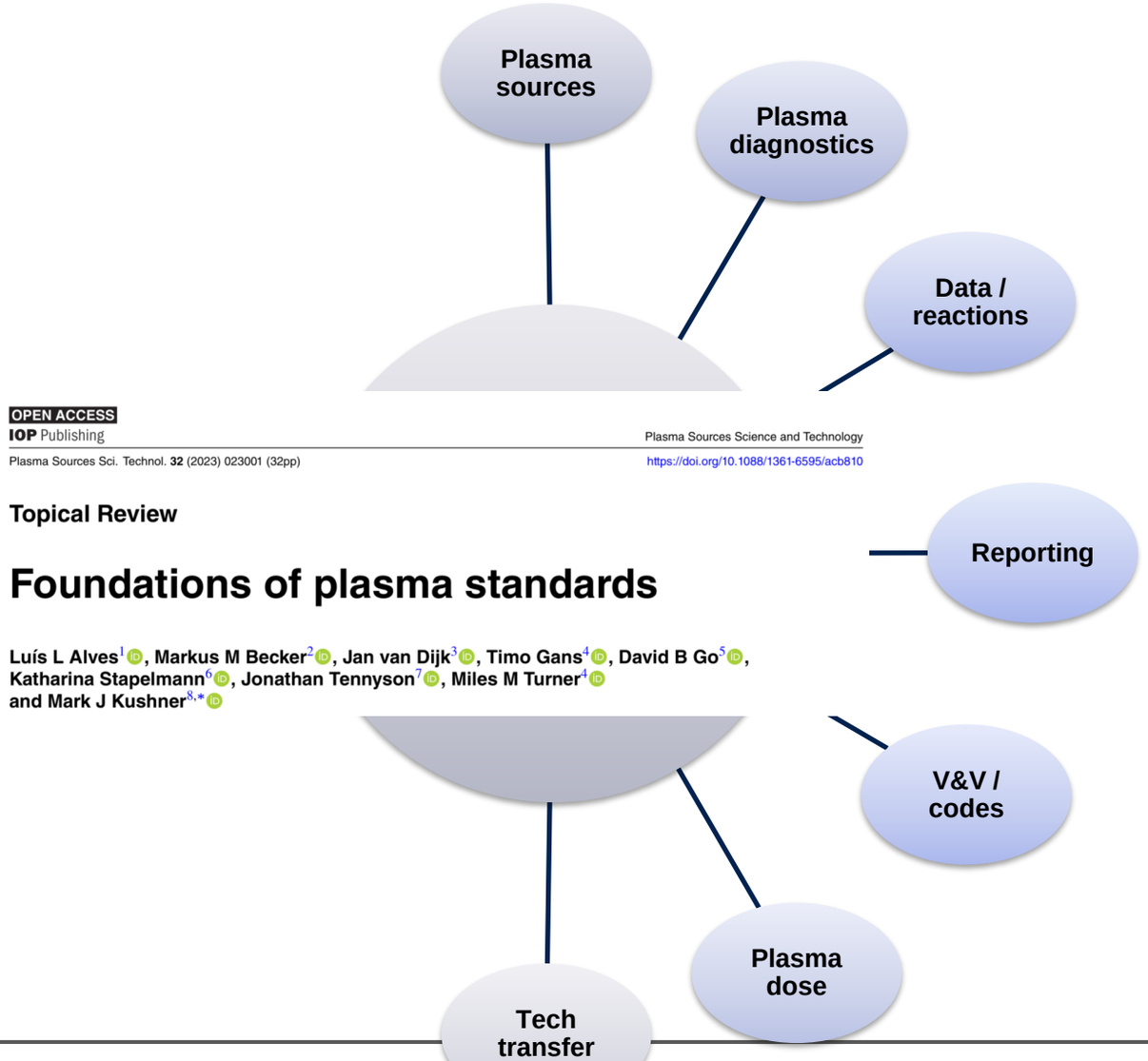
RDM in the low-temperature plasma community

Markus Becker, Marina Prenzel

Bochum & online, 2023-05-03

RUHR UNIVERSITÄT BOCHUM
RUB
INP FROM IDEA TO PROTOTYPE
C A U Christian-Albrechts-Universität zu Kiel

Broad relevance of plasma standards



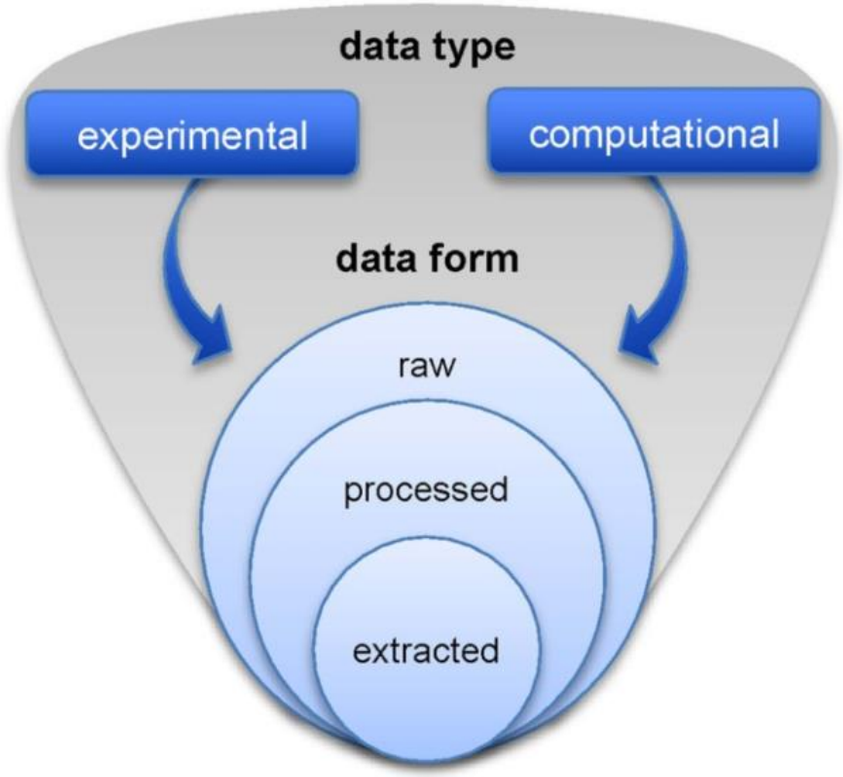
OPEN ACCESS
IOP Publishing
Plasma Sources Science and Technology
Plasma Sources Sci. Technol. **32** (2023) 023001 (32pp)
https://doi.org/10.1088/1361-6595/acb810

Topical Review

Foundations of plasma standards

Luís L Alves[1], Markus M Becker[2], Jan van Dijk[3], Timo Gans[4], David B Go[5], Katharina Stapelmann[6], Jonathan Tennyson[7], Miles M Turner[4] and Mark J Kushner[8,*]

Types of data from different sources

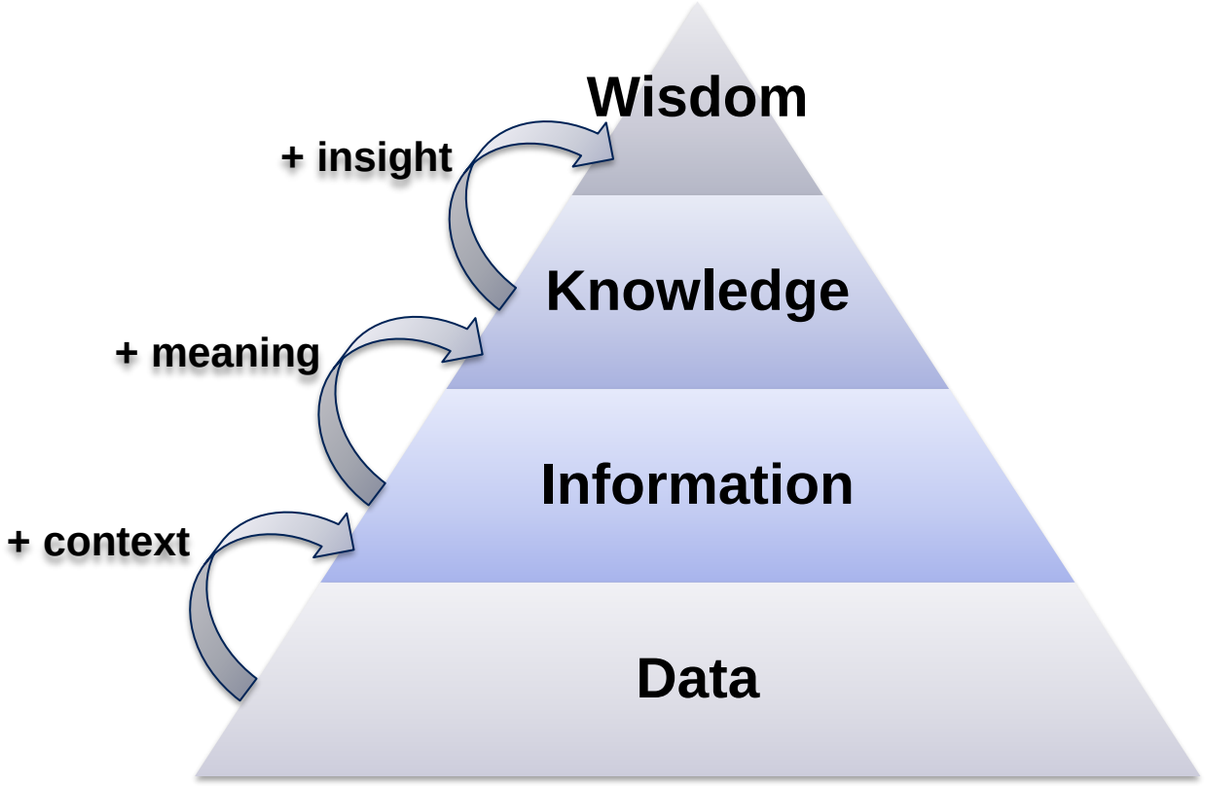


Transparent data provenance needed

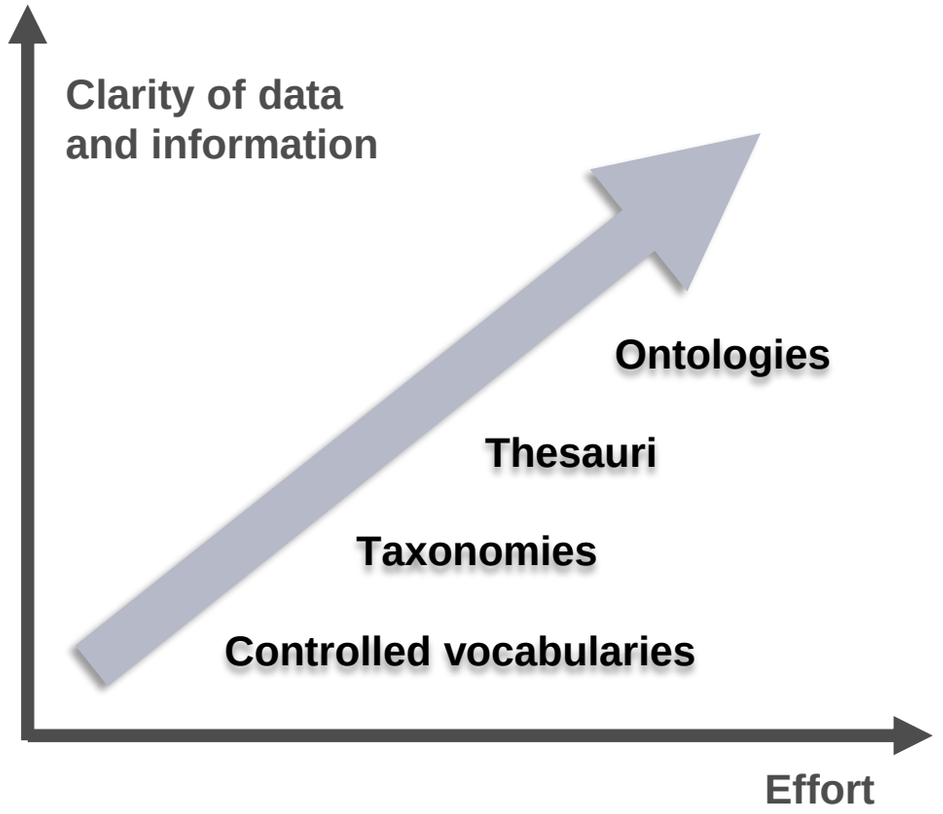
L.L. Alves *et al.*, *Plasma Sources Sci. Technol.* **32** (2023) 023001

From data to wisdom with metadata

DIKW pyramid

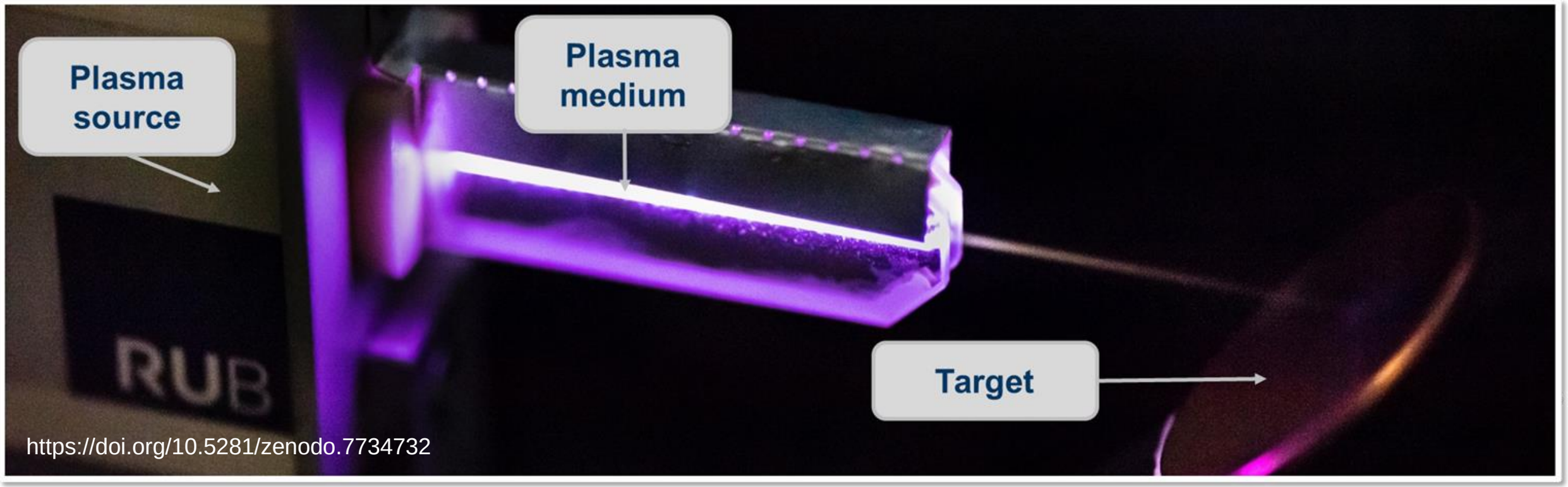


Formality levels of metadata



→ Data about data (**metadata**) are the key to efficient data (re-)use

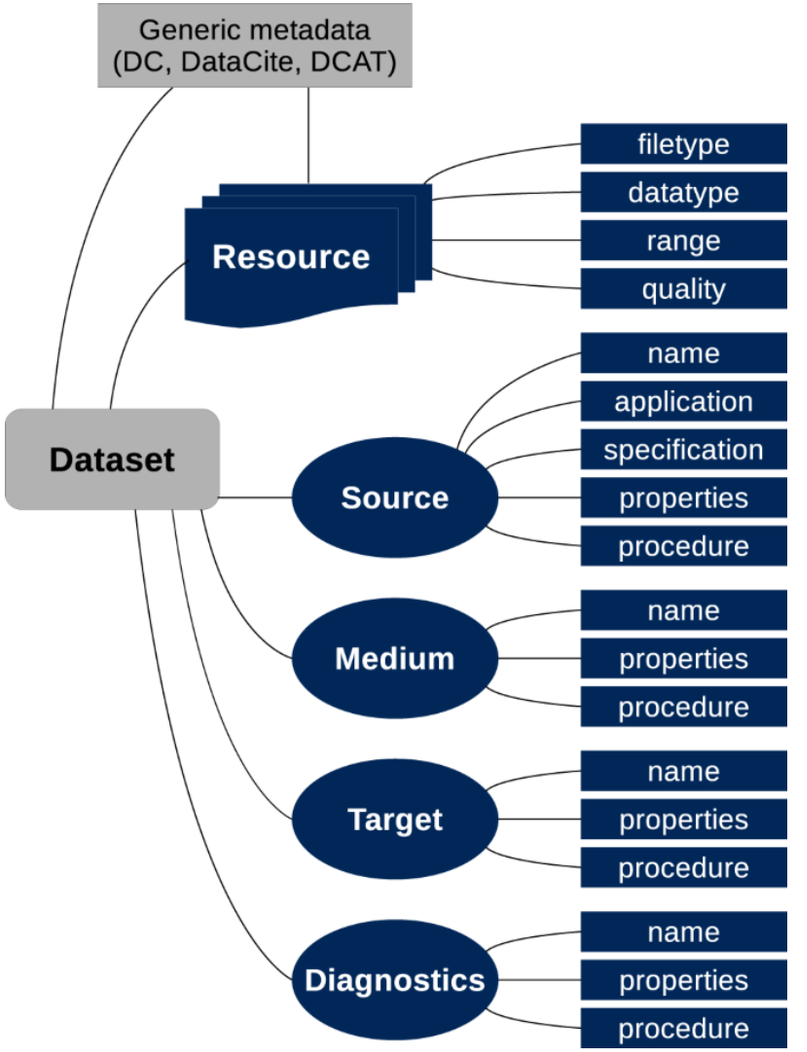
Relevant metadata in LTP research



- Data obtained by electrical / gas / plasma / surface **diagnostics** → experiments and simulations
- Description of **source**, **medium**, **target**, **diagnostics** and **resources** (data files) for reuse of datasets

Plasma metadata schema

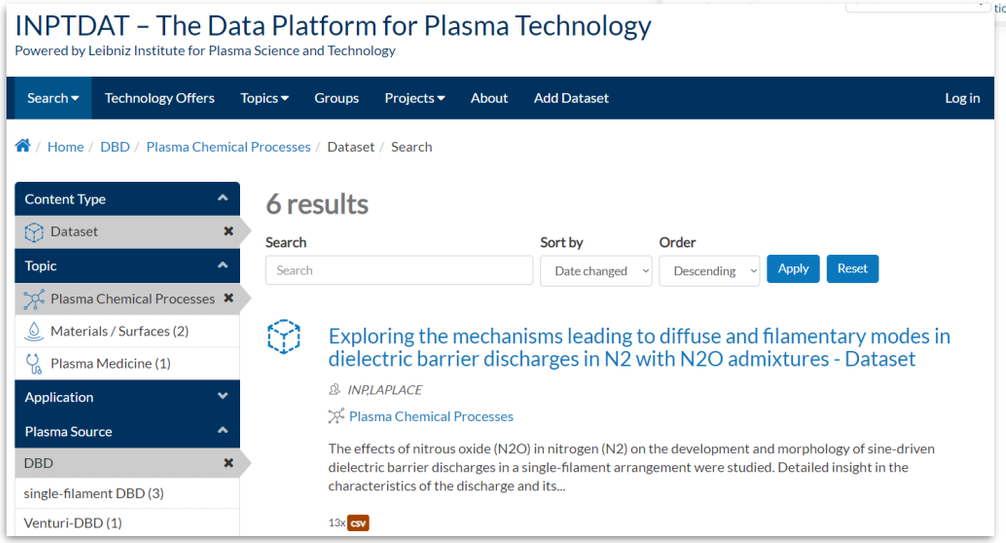
- Metadata schema for applied plasma science
- Standardised description of
  - plasma source
  - plasma medium
  - plasma target
  - diagnostics (experiment and modelling)
  - resources (data)



S. Franke *et al.*, *Sci. Data* **7** (2020) 439
https://github.com/plasma-mds/plasma-metadata-schema

Plasma metadata schema

- Research data repositories implementing Plasma-MDS
  - INPTDAT (https://www.inptdat.de)
  - RDCPIDAT (https://rdpcidat.rub.de)
- Ongoing monthly workshops organised by INP, RUB and CAU
- Specific sub-schemas for various applications: https://www.plasma-mds.org



Regular Metadata Workshops

- Online workshops every third Friday of each month at 1 pm (duration of 60 up to 90 min)
- Join mailing list to stay tuned and benefit
- Re-use schemas for your own experiments
- Contribute to the further developments with your expertise and user experience
- Share your own schemas / templates
- Publish your digital data with metadata
- More information on **plasma-mds.org**

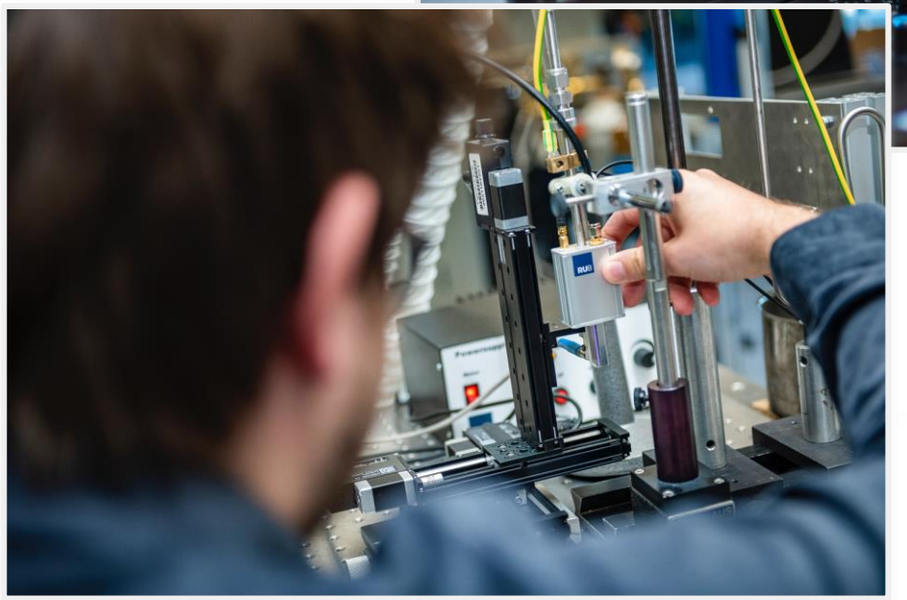
2021	
26 Nov, 2021	Atmospheric pressure plasma jets (APPJ)

2022	
16 December, 2022	Wrap-up 2022
18 November, 2022	High-speed imaging
21 October, 2022	Optical emission spectroscopy (OES) - part 2
16 September, 2022	Mass spectrometry (MS)
19 August, 2022	X-ray photoelectron spectroscopy (XPS) - part 2
08 July, 2022	Optical emission spectroscopy (OES)
17 June, 2022	Plasma modeling and simulations
20 May, 2022	Fourier-transform infrared spectroscopy (FTIR)
29 Apr, 2022	X-ray photoelectron spectroscopy (XPS)
18 Mar, 2022	Passive high-voltage probes
18 Feb, 2022	Oscilloscope measurements
21 Jan, 2022	Low pressure plasmas (LPP)

2023	
3-4 May, 2023	2nd Workshop on FAIR Data in Plasma Science
17 March, 2023	Ion chromatography (IC)
24 February, 2023	Laser-induced fluorescence (LIF) - part 2
20 January, 2023	Laser-induced fluorescence (LIF)

INF - CRC 1316

- Chairs from various disciplines are involved within the CRC 1316
  - Plasma physics
  - Plasma technology
  - Theoretical engineering
  - Biology
  - Chemistry
- Need on research data management differs as well
- Need is recognized, support in implementation



INF - CRC 1316

Challenges

Organizational

- Various research group work within the CRC 1316
- Research focus varies strongly
- Communication to all researchers required

RDM related

- Knowledge of groups on RDM differs
- Demands on RDM are not homogenous btw. groups

Measures

➔ All dates available on https://sfb1316.rub.de/index.php/en/support-projects/research-data-management

➔ Mailing address sfb1316+rdm@rub.de

Data experts

INF ↔ Data experts

- Exchange on demands
- Exchange on new developments

Organizational aspects

- All research fields represented
- Regular meetings
- Working as multiplicators

Tools for research data management along the data lifecycle

Plasma-MDS

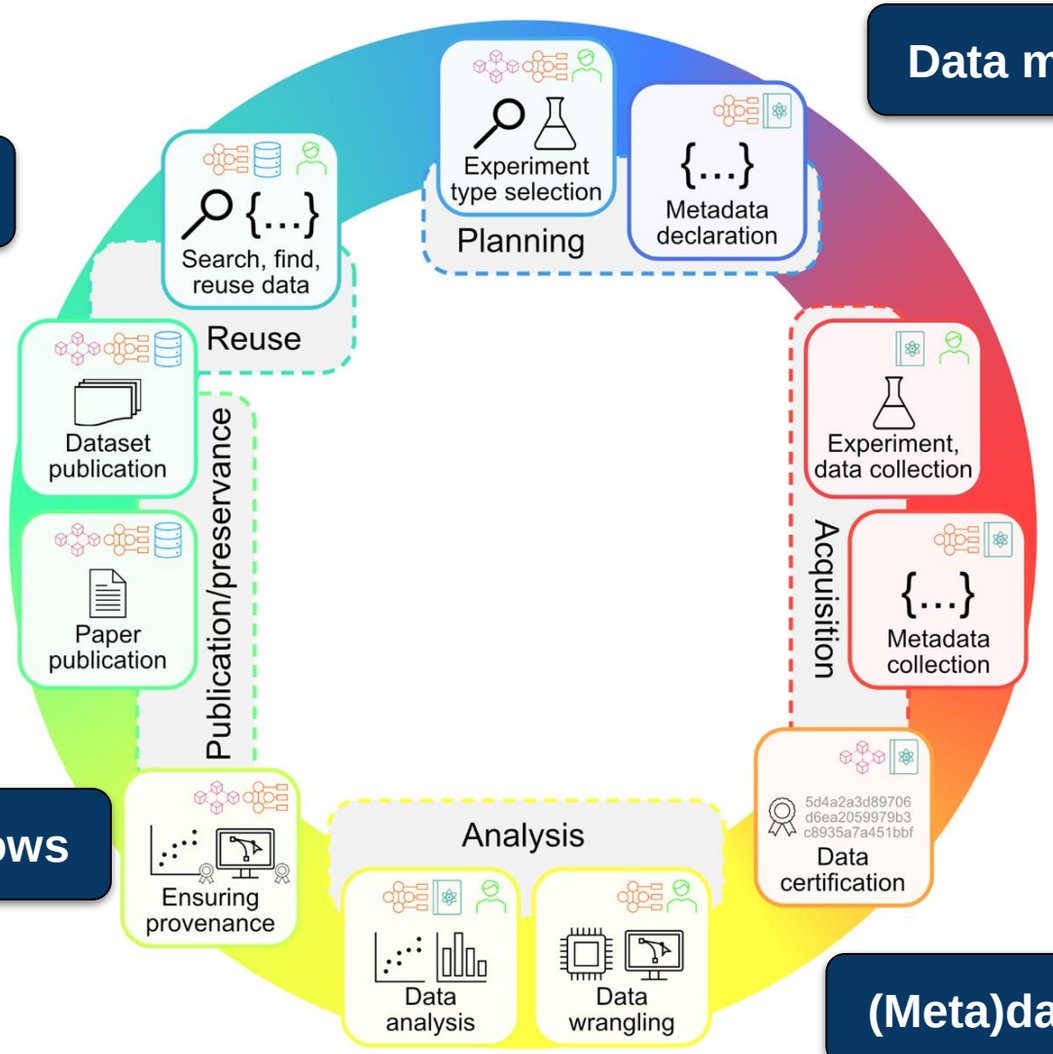
Data management plan

Data repository

Electronic lab notebook

(Meta)data pipelines / workflows

(Meta)data pipelines / workflows



Tools for research data management along the data lifecycle

Plasma-MDS

Data management plan

- Templates for DFG, EU, …

Data repository

- INPTDAT

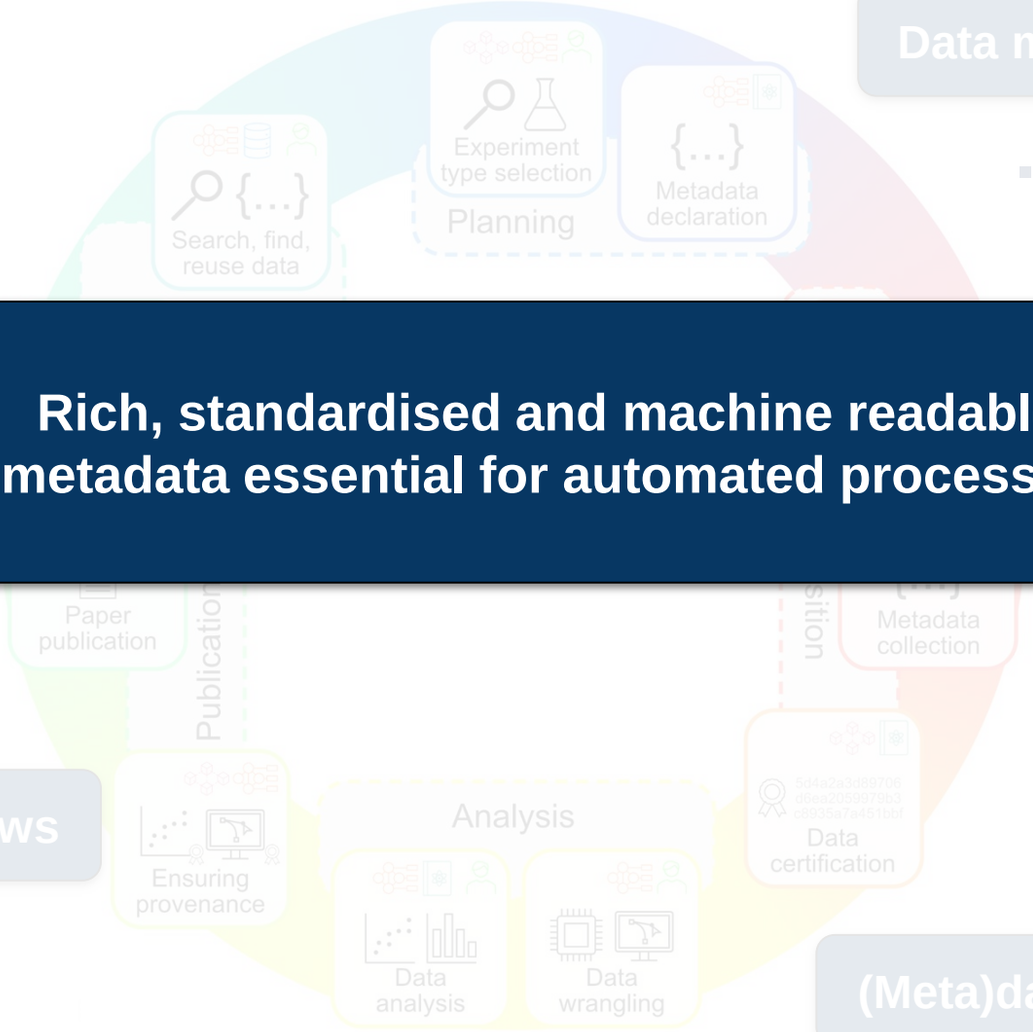
Rich, standardised and machine readable metadata essential for automated processes

Electronic lab notebook

- eLabFTW
- Adamant

(Meta)data pipelines / workflows

(Meta)data pipelines / workflows



RDM tools at INP

Plasma-MDS

- **eLabFTW** as electronic lab notebook
- **Adamant** for easy collection of structured metadata (based on JSON and JSON schema)
- Integration of **eLabFTW and Adamant**
- Digital **workflows** for collection, storage and re-use of machine readable metadata
- Different focus on eLabFTW, Adamant or **integrated solutions**, depending on lab demands
- **INPTDAT** for data publications

- Overarching metadata schemas, terminologies, plasma ontology

eLabFTW

EXPERIMENTS DATABASE TEAM SEARCH DOCUMENTATION

Experiments

Back to listing

Create

Running ★★★★★ COST jet Surface treatment
Started on 2023-05-01

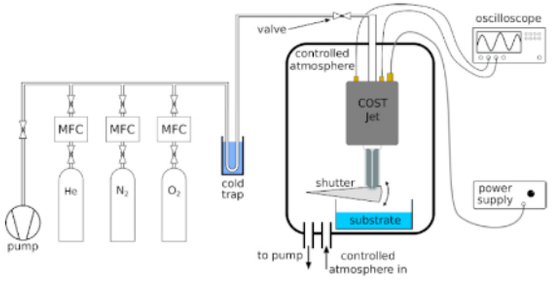
Visibility EDIT
Only me

Can write EDIT
Only me

Example experiment with COST jet

Study/Experiment purpose (general information about the study/experiment)
Tell something

Setup (description and sketch)
Verbal description, sketches, ...
Plasma treatment was performed with Device - COST Jet Id4425
Treated sample: Sample - Example sample id4456



(Image from J. Golda et al. J. Vis. Exp. 165 (2020) e61801, https://dx.doi.org/10.3791/61801)

Measurements (description of the procedure and list of parameters)
Measurements were done according to protocol Protocol - Treating Surfaces with a Cold Atmospheric Pressure Plasma using the COST-Jet

Evaluation/Results (evaluation steps and summary)
Evaluation steps, conclusions, ...

Path to data // Datenverzeichnis
Paste it here ...

Linked items

- DEVICE - COST Jet Id4425
- LAB UNIT (MESSPLATZ) - E.17-QPTDat
- PROJECT - XS9324-QPTDat
- PROTOCOL - Treating Surfaces with a Cold Atmospheric Pressure Plasma using the COST-Jet
- SAMPLE - Example sample id4456

Attached files

json_schema.json	json_data.json	CostJetExperiment.jpg	image.png
Click to add a comment	Click to add a comment	Click to add a comment	Click to add a comment

JSON Editor

Open Adamant | Load metadata | Add field | Import from file | Clear

Editing metadata

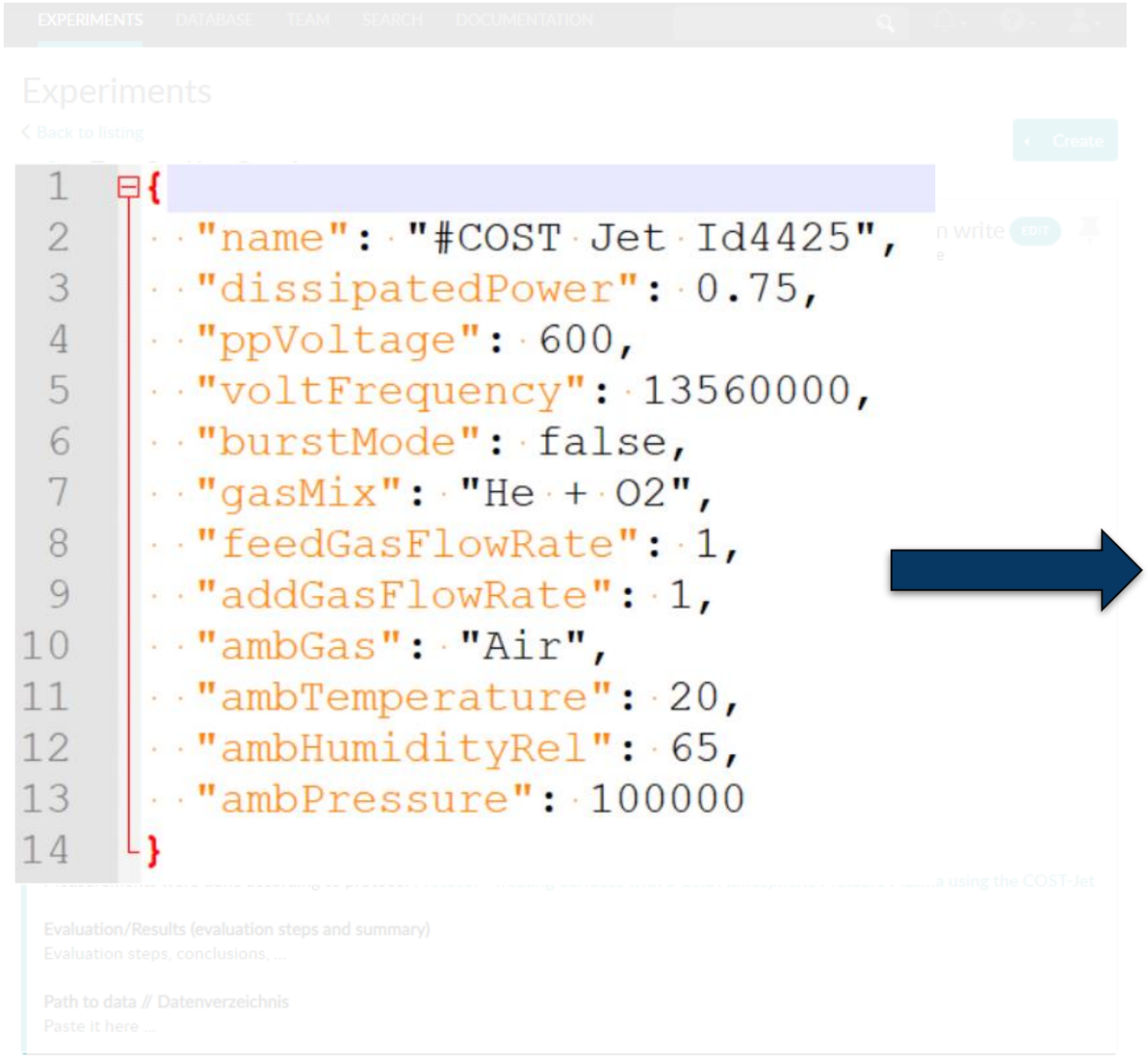
Comments

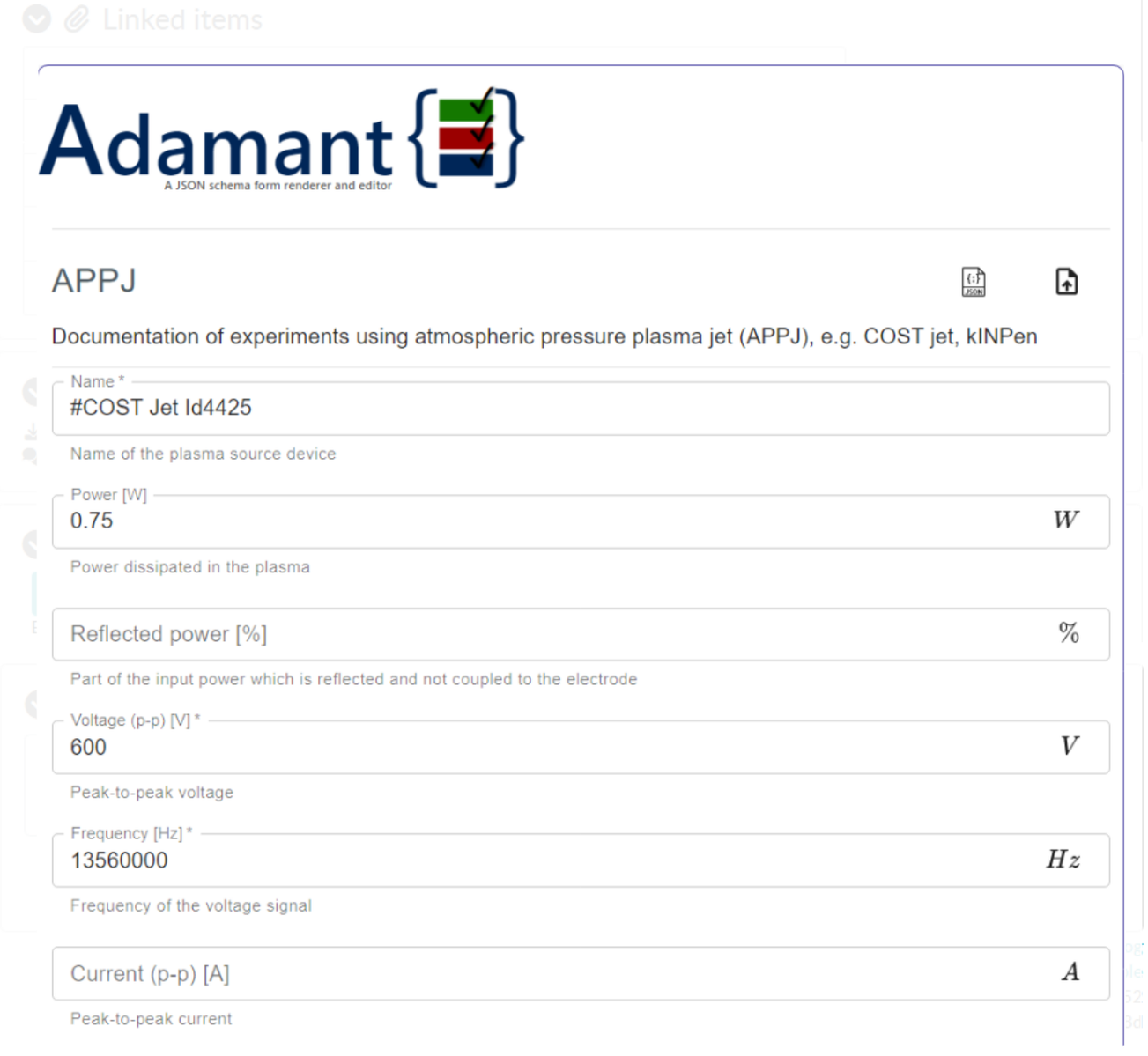
Add a comment

SAVE

See changelog
3 revisions available
Last modified on 2023-05-02 09:26:52
Unique eLabID: 20230501-d3dab80efe02e177fe5426bde613ce1330a2ba8d

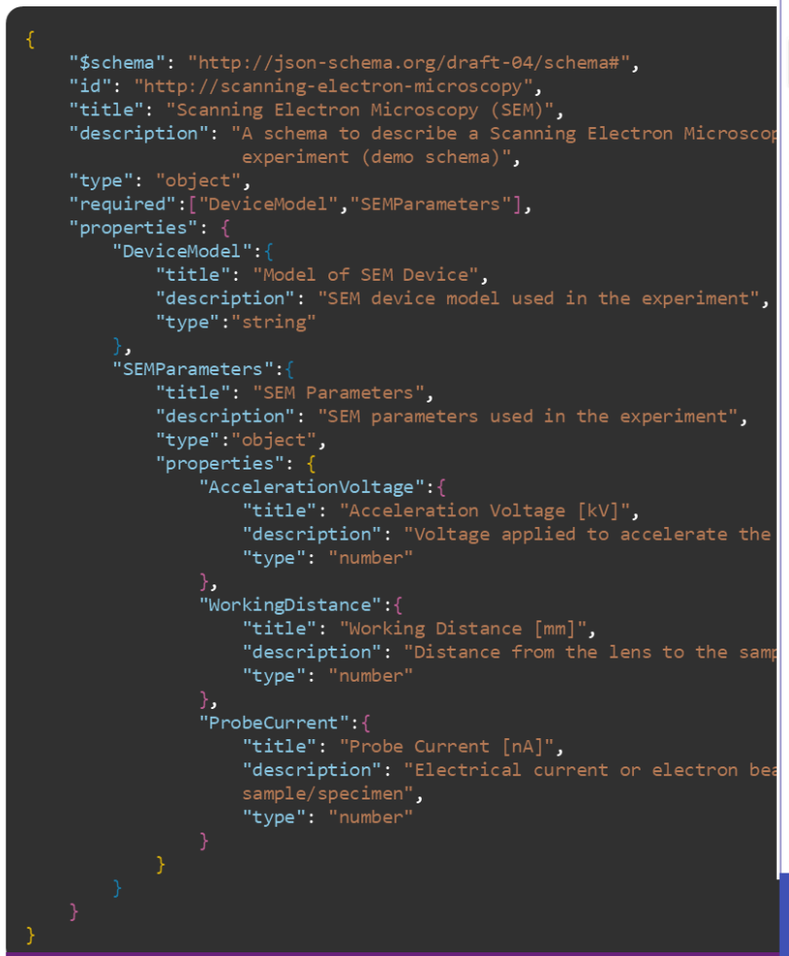
eLabFTW → integration with Adamant



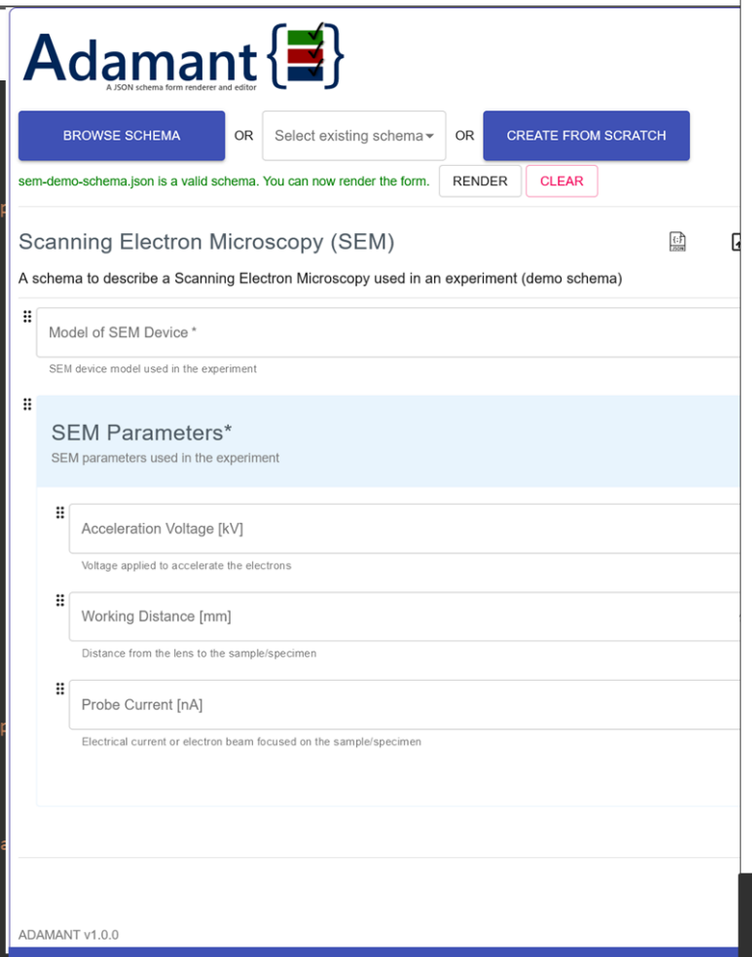


Basic functionality of Adamant

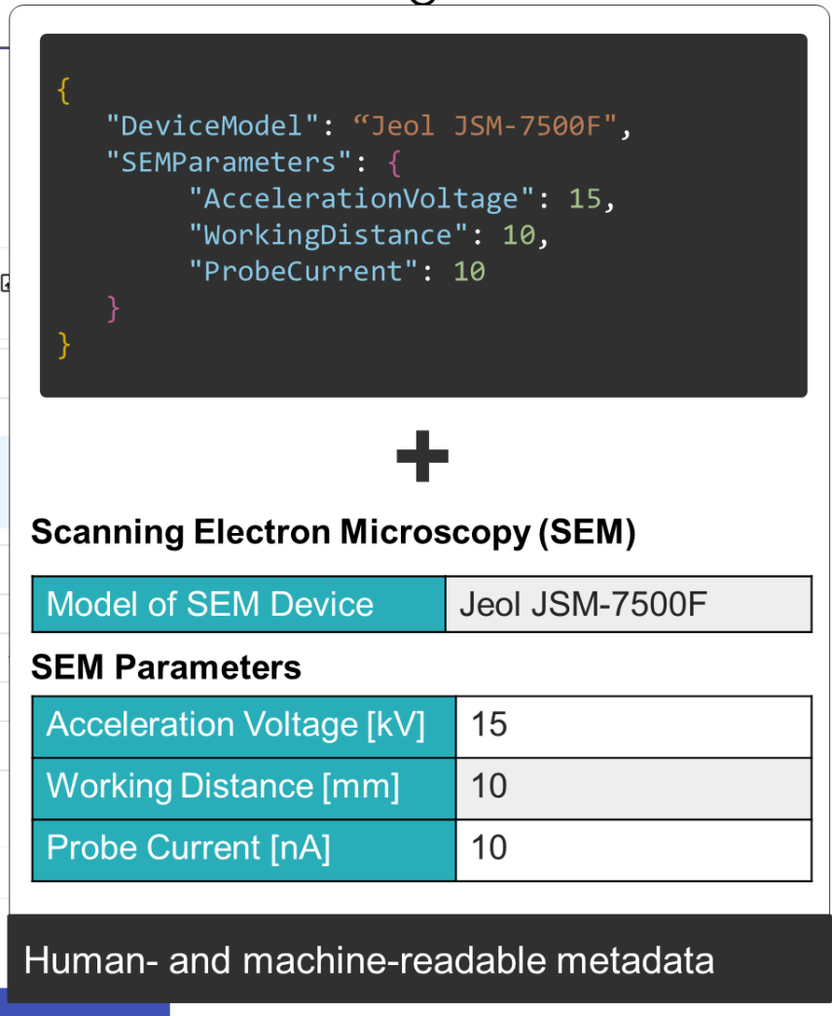
Plasma-MDS



Metadata schema described in JSON



Dynamically rendered (editable) web form

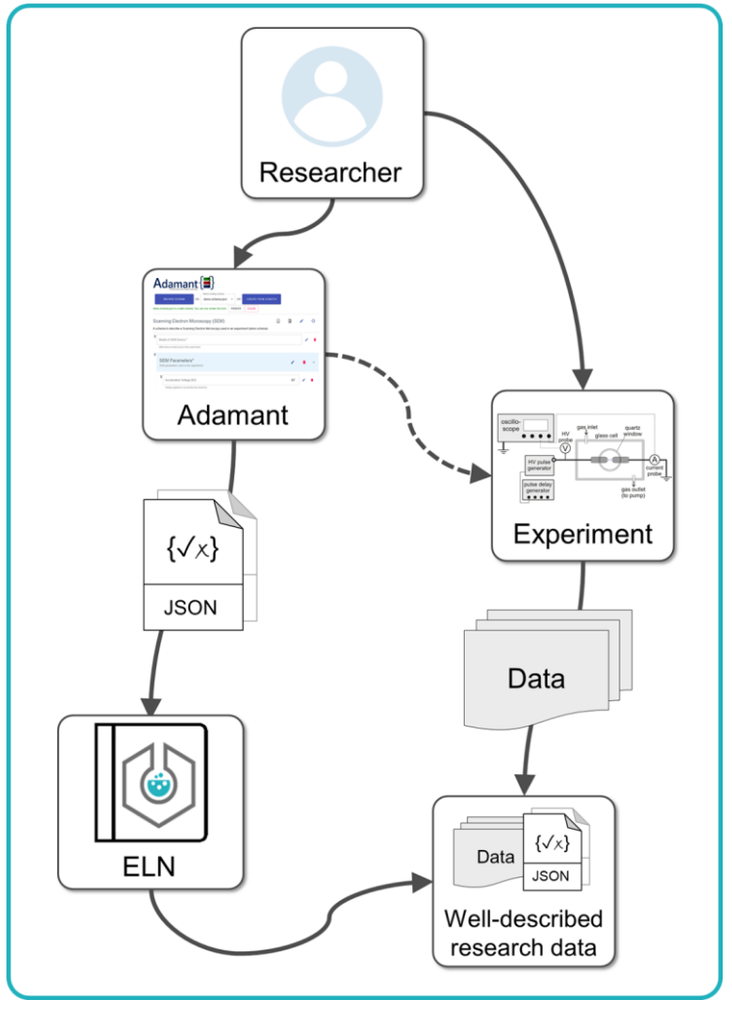


Human- and machine-readable metadata

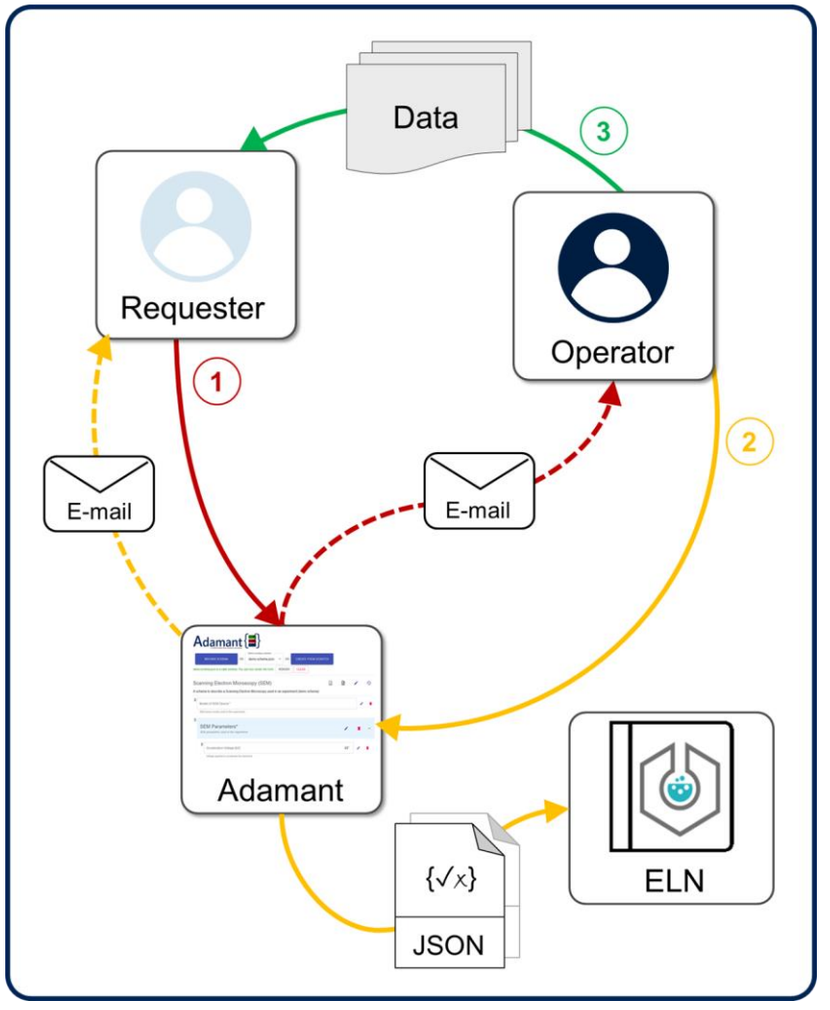
https://plasma-mds.github.io/adamant/

Workflow implementations with Adamant

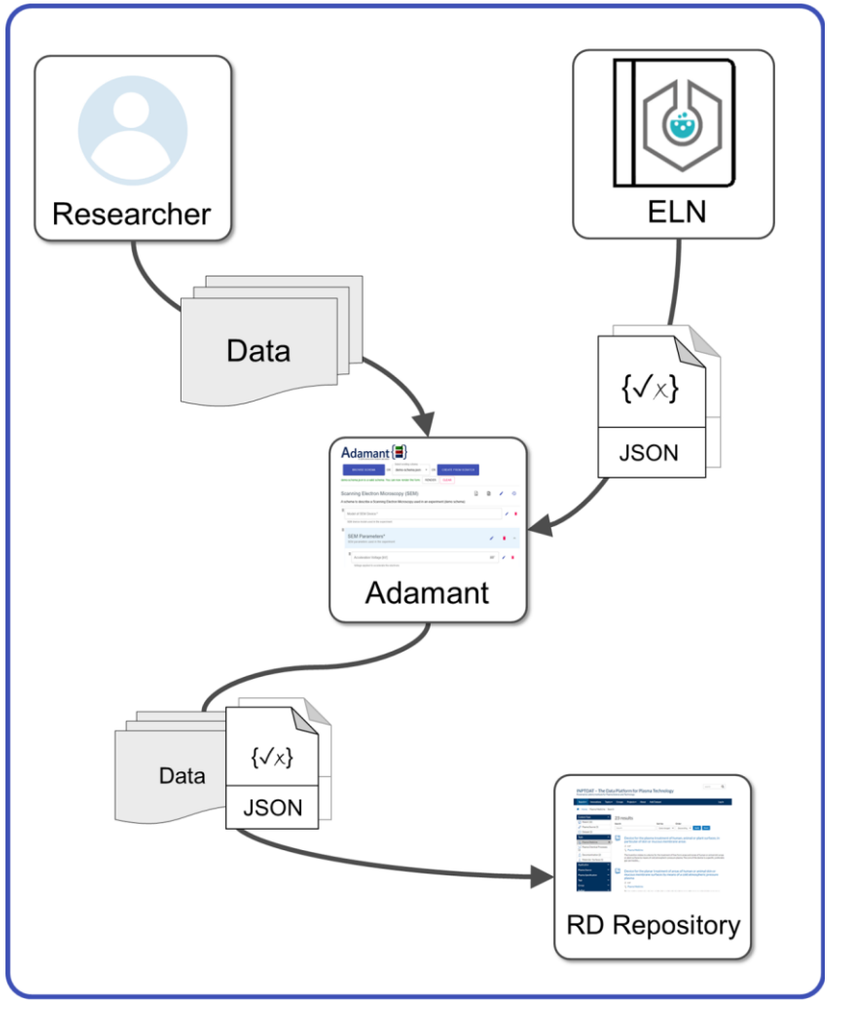
Metadata collection



Job request

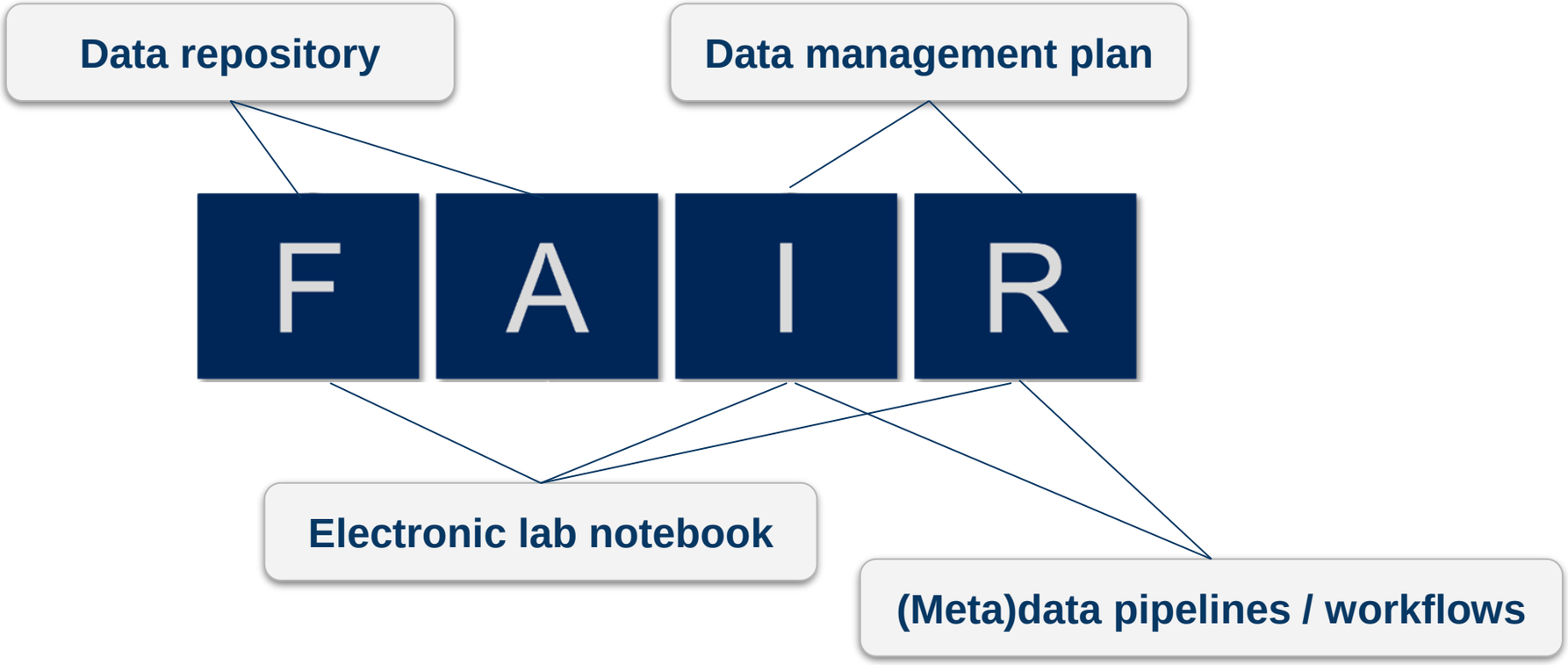


Data publication



Summary

- Many different aspects concerning FAIR principles already mentioned
- Different tools address different aspects of FAIR



- What can you pull out for yourself?
- More in the course of the workshop