HELMHOLTZ

HMC

RESEARCH FOR
GRAND CHALLENGES

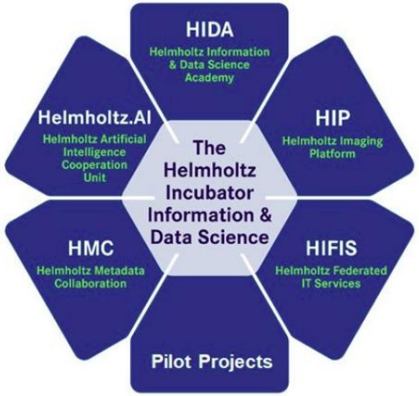
HELPMI:
the Helmholtz Laser-Plasma Metadata Initiative

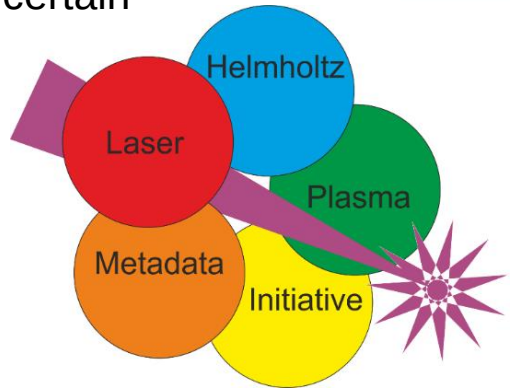
Start developing a data standard for the global LPA community

Helmholtz Laser-Plasma Metadata Initiative

HELMHOLTZ Metadata Collaboration

- Helmholtz Association operates most large-scale research centers and infrastructures in Germany
- Incubator framework for innovation: Metadata, AI, IT services etc.
- Yearly call for proposals for quick projects (2 years), conducted by >2 Helmholtz partners
- 200k€ additional funding for projects, allowing to prioritize certain activities
- HELPMI: within HMC (Helmholtz Metadata Collaboration)
  - GSI, HI Jena and HZDR
  - April 2023-‘25

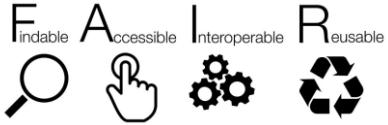




HELPMI: Main Goals

HELMHOLTZ Metadata Collaboration

- Initiative: **start** the development of a data standard for LPA experiments
  - Consulting and assistance from HMC community
  - Concepts, tools, trends, best practices, lessons learned…



- **Adopt NeXus standard** from PaN experimental community
  - Use existing base classes, possibly define new ones
  - Propose application definition

NX

„an umbrella over a family of standards
c

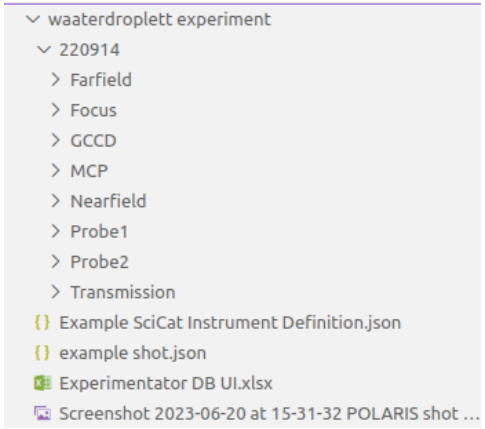
- **Extend the openPMD standard** and API for arbitrary hierarch
  - Currently established for simulations in LPA community
  - Fileformat-agnostic

openPMD

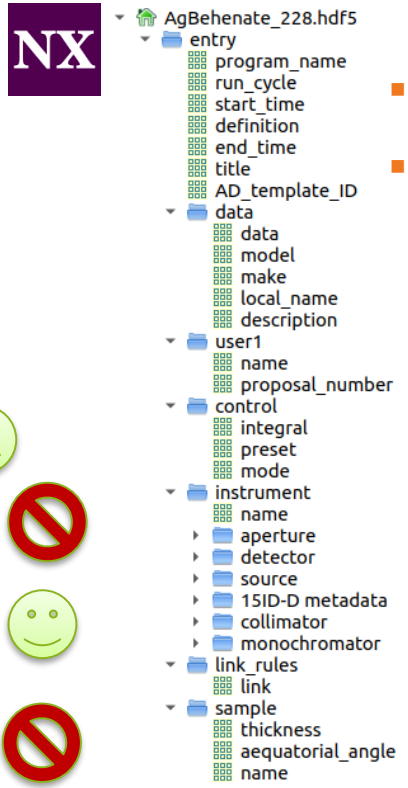
Generate a glossary:
Domain-specific terms

HELPMI: Working example

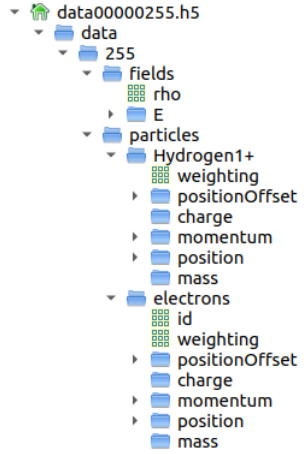
Example data chunk to perform our trials, and other examples



- Hierarchical structure
- Meta/Data in folder names
- Files containing instrument and experiment description
- Setup models, calibration, scripts

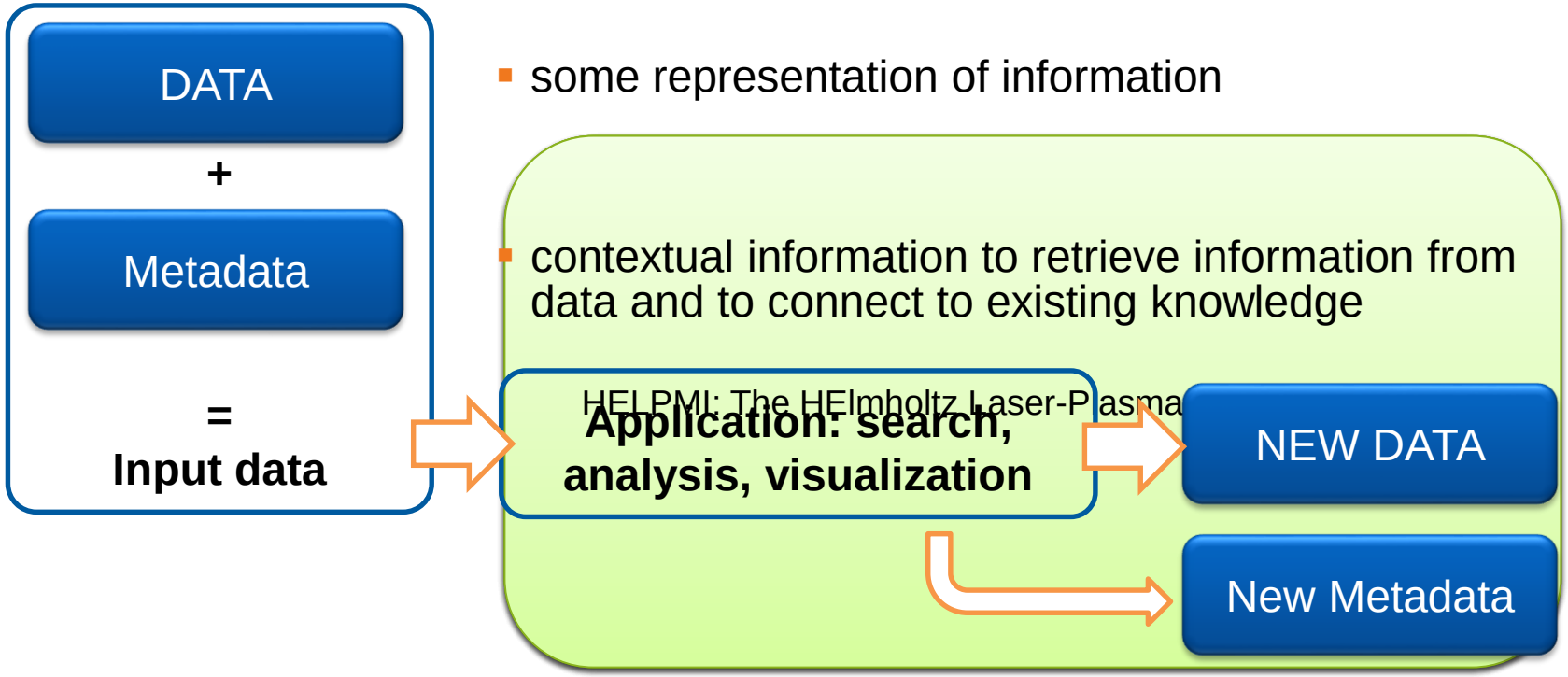


- Data fields with attributes
- Groups for logical gathering (hierarchy)
  - Links for arbitrary layouts
- NeXus base classes encoded in attributes NX_class
- Named fields
  - partly by definition



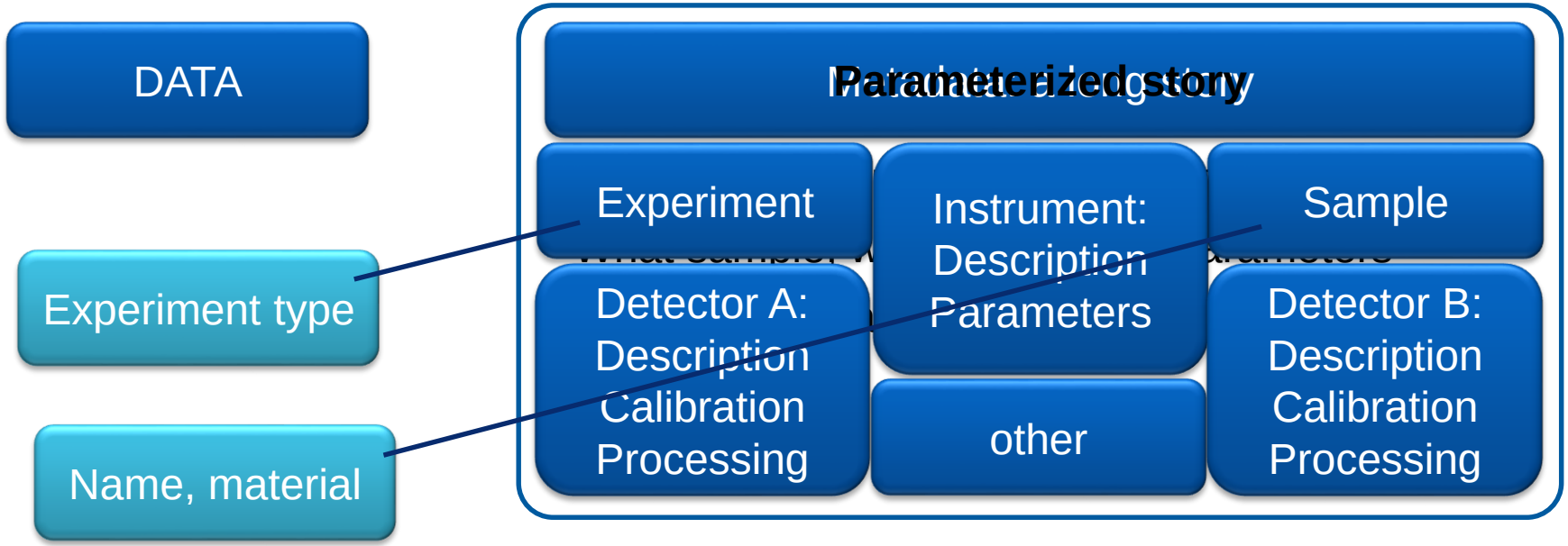
Data and metadata

Their connection to information and knowledge



Metadata standardization

Data-ization of metadata



Modelling of experiments

Level of complexity to be defined by community

Physics Model

- Quantities
- Relations
- Interactions
- Approximations
- Observables

Conceptual design model

- Implementation-independent
- Experiment parameters
  - To be set
  - To be measured

Technical design model

- Implementation-specific
- How to be measured or set
  - e.g. accuracy

Experiment

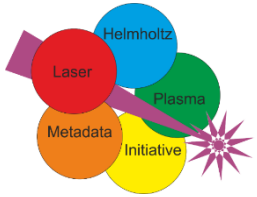
- Type
- Instrument
- Sample
- Detectors

Why standards?

- Why tie myself down?
- Why fix something that‘s not broken?
- Why follow external rules?
- What‘s in for me?
- Working with others is a hassle!

- You commit only to your own community.
- When your‘s breaks, it‘s your problem.
- Contribute and make them your rules!
- Efficiency means less work on long term.
- Interoperability shares the work!

Acknowledgements



HMC HELMHOLTZ Metadata Collaboration

- Contact us: helpmi@hzdr.de
- Contribute: Workshop @ GSI Nov 13/14
  - https://indico.gsi.de/e/helpmi-workshop-2023
- Some slides were inspired by
  - S. Brockhauser @ FAIRmat Tutorial #6 on Metadata standarisation
  - B. Watts @ HDF5 and Nexus

Who is HELPMI?

- GSI: Johannes Hornung, Udo Eisenbarth, Vincent Bagnoud
- HI Jena: Alexander Kessler, Malte Kaluza
- HZDR: Franz Pöschel, Michael Bussmann, Alexander Debus, Hans-Peter Schlenvoigt
- Project Observers: Axel Huebl, Andreas Doepp, Rajeev Pattathil, Birgit Plötzeneder, Lajos Schrettner, Balázs Bagó

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