



Integrated workflows and tools for data management in plasma technology

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Int. Workshop on FAIR Data in Plasma Science May 16, 2022

FROM IDEA TO PROTOTYPE

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Challenges in plasma technology



- Research is in a wide range characterized by **small-scale table-top experiments**.
- Variety of plasma sources and applications lead to the situation that setups in the different research groups are unique in almost all cases.
- Not only the processes in the plasma but the manifold interactions with gaseous, liquid and solid surroundings are usually important.
- Scientific results can hardly be compared and validated on a quantitative level without an almost complete documentation of the experiments including the diagnostic tools.











 Large gap between researchers requirements and RDM tools for data management according to the FAIR principles









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Introducing Adamant:

A general purpose tool for schema based metadata collection





- User-friendly web tool built on top of JavaScript (ReactJS) and Python (Flask)
- Simplifying the use and creation of metadata schemas
- Automatic generation of web-forms
- Based on the well-known JSON schema standards
- Highly human- and machine readable metadata collection
- API-based integration with external applications
- Incorporating different components to achieve integrated RDM workflows







Documentation of experiments leading to FAIR data



Publication of FAIR-assured dataset with records of ownership







Documentation of experiments leading to FAIR data



Publication of FAIR-assured dataset with records of ownership













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Documentation of experiments leading to FAIR data



Publication of FAIR-assured dataset with records of ownership









- Initial implementation under a tool code-named "Plasma Blockchain Bridge" or PBB
- Blockchain technology for records of ownership
- Merge with the Adamant tool is planned
- JSON documents (stored in the ELN) created during the experiment planning/design can be reused







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Publication of FAIR-assured dataset with records of ownership



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Ontology and knowledge graph for standardized and *assisted* experiment design, and quick re-use of existing metadata





- Standardized experiment documentation
- Community approved
- ✓ Modular schemas
- ✓ Interconnected
- ✓ Reuse of existing documentation
- ✓ Auto. suggestions on experiment design



Ontology and knowledge graph for **standardized and** *assisted* **experiment design**, and quick re-use of existing metadata



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Ontology and knowledge graph for **standardized and** *assisted* **experiment design**, and quick re-use of existing metadata



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Ontology and knowledge graph for standardized and assisted experiment design, and quick re-use of existing metadata



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Ontology and knowledge graph for **standardized and** *assisted* **experiment design**, and quick re-use of existing metadata



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Ontology and knowledge graph for standardized and *assisted* experiment design, and **quick re-use of existing metadata**



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Ontology and knowledge graph for standardized and *assisted* experiment design, and quick re-use of existing metadata



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Ontology and knowledge graph for standardized and *assisted* experiment design, and **quick re-use of existing metadata**



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Summary



- Diverse small-scale experiment setups with unique results → more integrated RDM workflows needed
- Considered technology components: ELN, ontology/knowledge graph, blockchain, online data repository → FAIR research data
- Large gap between RDM and researchers
- QPTDat approach: Intuitive and user-friendly RDM tool (Adamant) for integrated workflows, developed closely with the researchers → closing the gap between RDM and researchers
- Blockchain for claiming and proving data ownership
- Planned implementation: Ontology/Knowledge graph for better planning of experiments and semantic search features



Contact





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