Open Science for Plasma Technology

L. Paulet*[,1], F. Hoppe[2,3], D. Loffhagen[1], H. Sack[2,3], V. Skwarek[4], T. Tietz[2,3], S. Tschirner[4], M. M. Becker[1]

[1]Leibniz Institute for Plasma Science and Technology (INP), Felix-Hausdorff-Straße 2, 17489 Greifswald, Germany

[2]FIZ Karlsruhe – Leibniz-Institut für Informationsinfrastruktur GmbH, Hermann-von-Helmholtz-Platz 1, 76344 Eggenstein-Leopoldshafen

[3]Karlsruhe Institute of Technology, Institute AIFB, Kaiserstr. 89, 76133 Karlsruhe

[4]Hochschule für Angewandte Wissenschaften Hamburg (HAW Hamburg), FTZ Digitale Wirtschaftsprozesse, Ulmenliet 20, 21033 Hamburg

*E-mail: lucian.paulet@inp-greifswald.de

INTRODUCTION

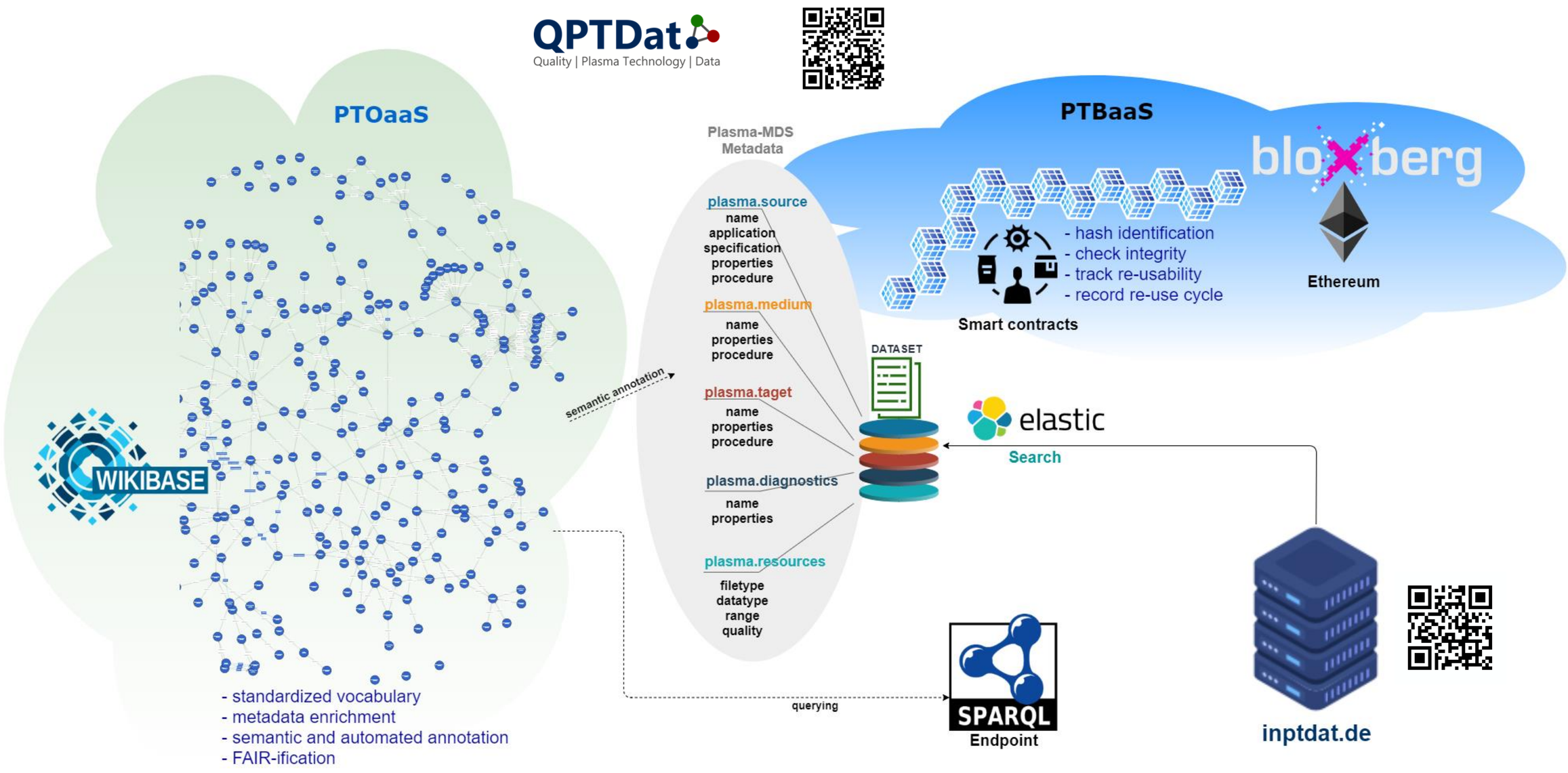
- Many research communities have realized that there is the need to make science as open and reproducible as possible, to create repository-like platforms, where research results can be published as datasets or resources, and to make the shared data FAIR („**F**indable, **A**ccessible, **I**nteroperable, **R**e-Usable“).
- Within the framework of the joint project QPTDat [1] we tackle this requirement for the plasma technology community by adding new features to the data platform INPTDAT:
  - » linking and enriching research metadata by means of a knowledge graph, based on a subject-specific ontology;
  - » quality assurance, reputation monitoring and reproducibility track with the aid of blockchain technology.
- These features will be developed as external services available to the entire plasma technology community and are expected to encourage community involvement, to generate reputational gains for researchers, and to bring the plasma technology community closer to the open science concept.

INPTDAT – PROTOTYPE FOR A COMMUNITY PLATFORM

The **IN**terdisciplinary **P**lasma **T**echnology **DAT**a platform INPTDAT [2] is based on the content management system (CMS) Drupal using DKAN design and functionality [3]:

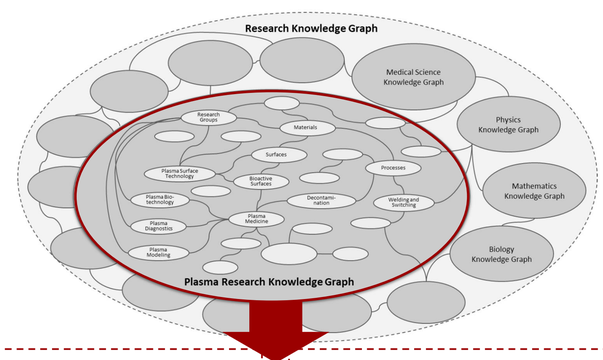
- Data publication with digital object identifiers (DOIs) from DataCite as specific type of persistent identifiers (PIDs)
- Data annotation by means of the subject-specific metadata schema (MDS) Plasma-MDS [4] as extension to existing general schemas like Dublin Core and DataCite
- Search framework with integrated faceted search, customized display of search results and adoption of external search engines, e.g. Apache Solr
- Interactive online visualizations for preview of resources and option for content specific visualizations of important entities.
- Plasma source catalog and cross-linking of related datasets
- Re-usable content by standard and custom APIs, ability to generate metadata exchange schemata in different JSON and RDF/XML catalog formats as well as support of metadata export according to DataCite and Plasma-MDS models

CONCEPT FOR OPEN SCIENCE IN PLASMA TECHNOLOGY



PTOaaS – Plasma Technology Ontology as a Service

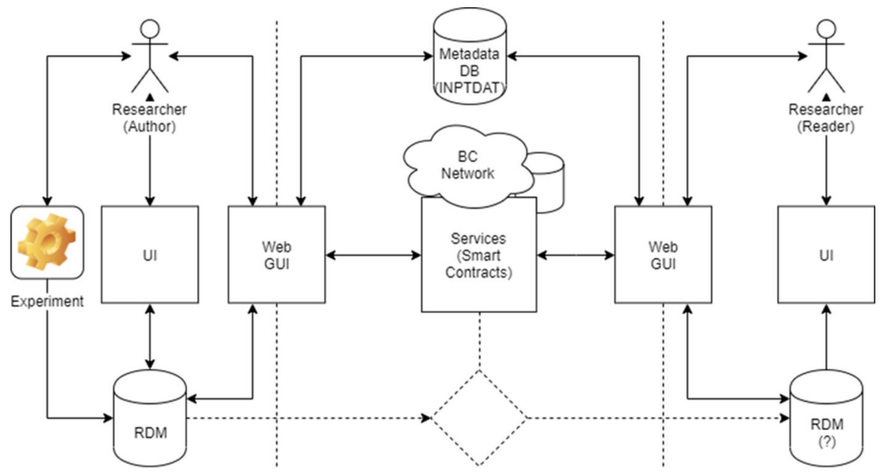
- External service providing a knowledge graph based on standardized vocabularies and relations, thereby supporting the data FAIR-ification
- Design by knowledge modelling experts involving the plasma technology community
- Ontology model comprising a core schema and subject-specific extensions, e.g. for plasma medicine and plasma surface technology, including the re-use of existing ontologies
- Basis for collaborative development of a plasma technology knowledge graph using Wikibase, which embeds subject-specific knowledge into a broader scope



- Design of plasma physics ontology → explicit, formal specification of plasma physics concepts
- Knowledge graph development → infrastructure to manage ontology and instance data

PTBaaS – Plasma Technology Blockchain as a Service

- External service which certifies the provenance and quality of the data
- Automation of curation processes and verification of quality criteria for published data
- Reputation monitoring by recording the data re-use cycle and tracking the re-usability of data, e.g. by a feedback system



References:

[1] QPTDat Project, https://www.forschungsdaten.org/index.php/QPTDat
[2] INPTDAT Data Platform, https://www.inptdat.de
[3] DKAN Open Data Platform, https://getdkan.org
[4] St. Franke *et al.*, arXiv:1907.07744, 2019

SPONSORED BY THE
Federal Ministry of Education and Research
This work is funded by the Federal Ministry of Education and Research (BMBF) under the grant marks 16QK03A, 16QK03B, and 16QK03C.