FAIRagro – in a nutshell and first results

Markus Möller on behalf of the FAIRagro Konsortium

Funded by DFG Deutsche Forschungsgemeinschaft German Research Foundation project number 501899475

In cooperation with nfdi

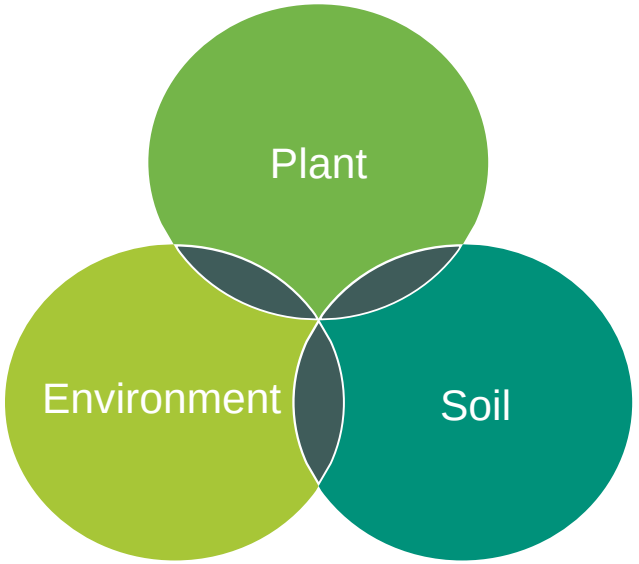
FAIRagro domain: scales, disciplines and data categories

→ Start 1.3.2023

FAIR data for agrosystem research: Crop production, ecosystems and landscapes whose sustainable management and development are based on systems understanding of plant-soil-environment interactions, taking into account cross-scale processes and relationships

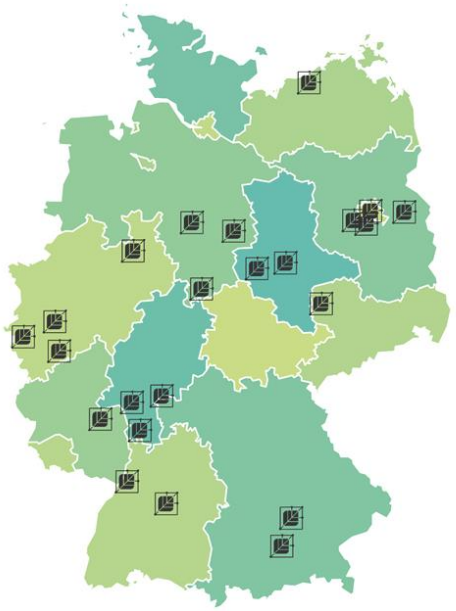
Scales

Subjects and disciplines



Data categories

Our partners: leading institutions in the agrosystem domain



11 (Co-)applicants + 19 participants

- Universities
- Universities of applied sciences
- Research institutes
- Federal (research) institutes
- Infrastructure facilities
- Governmental institutions
- Professional scientific associations

Representing important disciplines in

- Crop and vegetable sciences
- Soil sciences
- Agri-environmental sciences
- Socio-economics

project number 501899475

FAIRagro helpdesk https://fairagro.net/helpdesk/

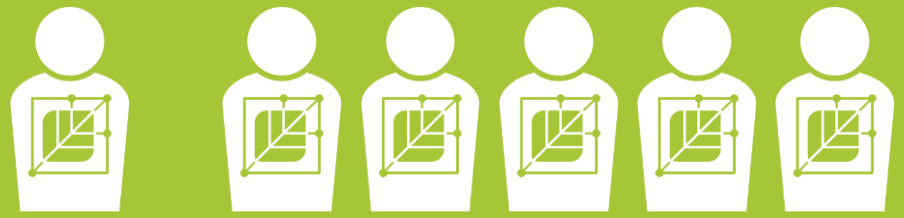
Agrosystem community

Use cases

- UC1 Breeding
- UC2 Agronomy
- UC3 Pest & disease
- UC4 LTE
- UC5 Sensor systems
- UC6 Integrated modeling

HELPDESK

Data Steward Service Center



Coordinator

Data Stewards

Combining expertises in
DMP, training, education, MIAPPE, copyright, licenses, DOI, spatial data, farming 4.0 data, data quality, long-term preservation, ...

info@fairagro.net | Toolbox for publishing and managing research data

FAIRagro Services

- Networked RDIs
- Search & Inventory
- Scientific Workflow Infrastructure
- ...

FAIRagro

FAIRagro helpdesk https://fairagro.net/helpdesk/

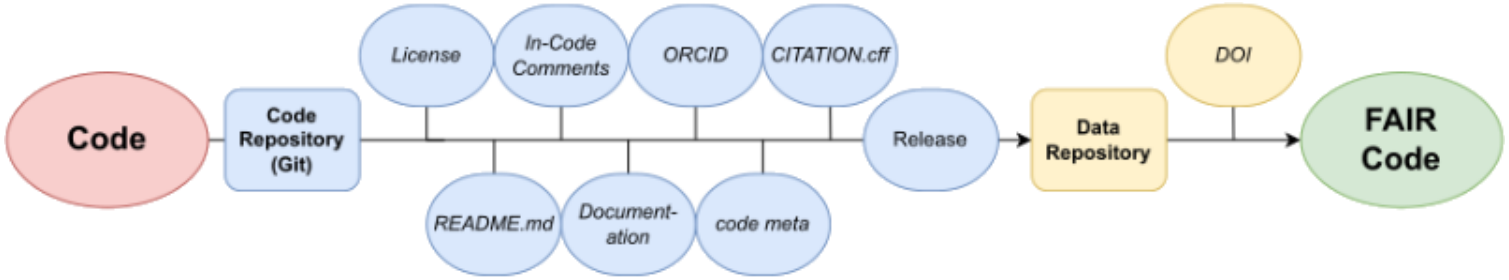
Publishing research code FAIR – a roadmap

Nowadays, research results are largely generated by self-developed software or code-based scripts. This code is regarded as an integral component of the scientist's independent research. The FAIR principles (Findable, Accessible, Interoperable and Reusable) have become widespread in recent years since their definition by Wilkinson et al. (2016), especially in the context of research data and its sustainable use. The FAIR availability of code, however, lags behind scientific publication and research data publication.

Open document
10.5281/zenodo.14772749

Making Code FAIR

It therefore makes sense to publish code FAIR, especially in the open access area, so that it can be found and reused in the scientific community on the one hand and its authors receive appropriate "credits" when it is reused on the other.



FAIRagro

https://fairagro.net

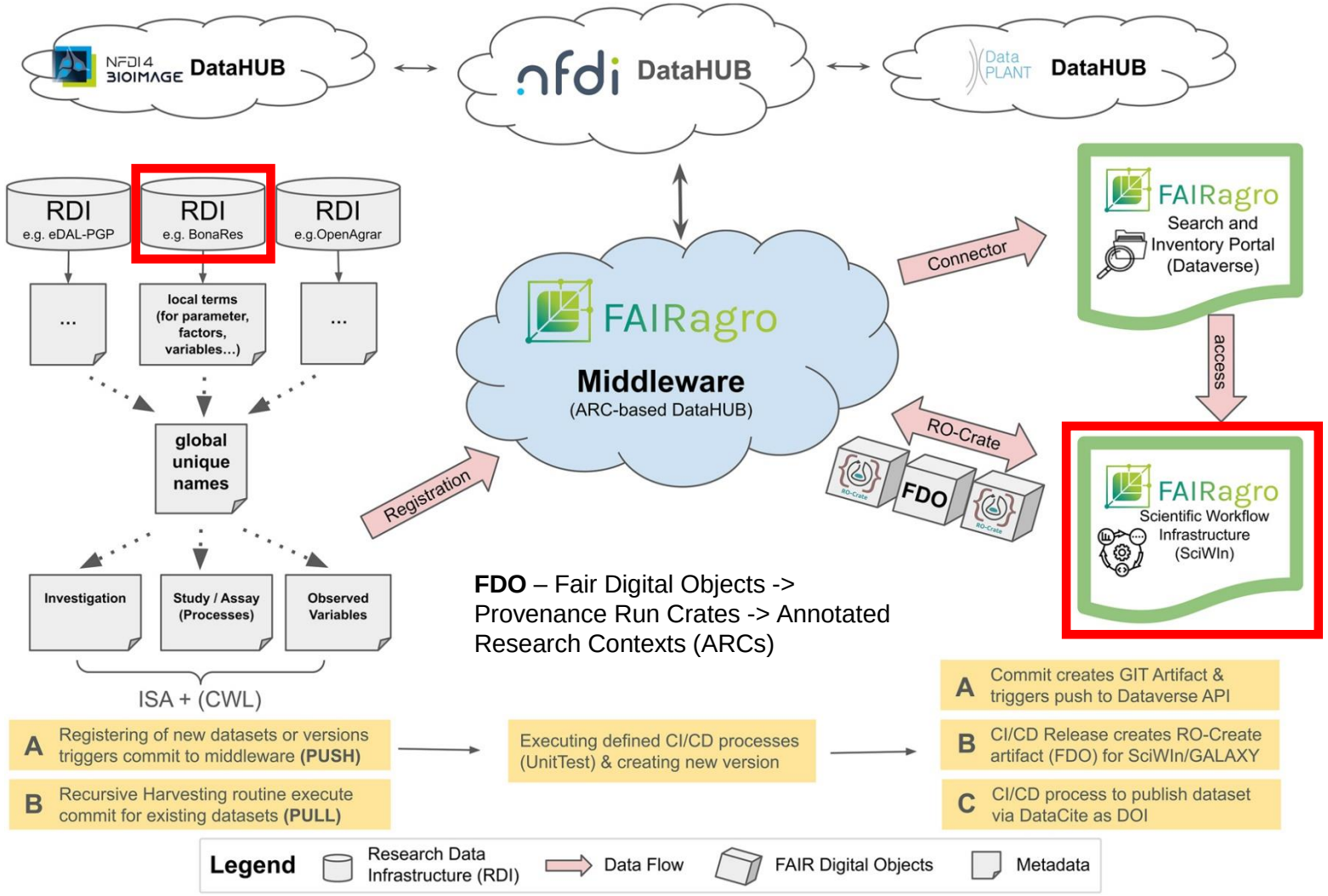
FAIRagro

About us | Participate | Get Informed | Toolbox | Helpdesk | Contact

About FAIRagro

The FAIRagro consortium with more than 30 partners is building a FAIR (**F**indable, **A**ccessible, **I**nteroperable, **R**eusable) research data management system for the agrosystems research community. We are developing the right tools and workflows to lay the foundations for sustainable crop production – now and in the future.

FAIRagro infrastructure: middleware

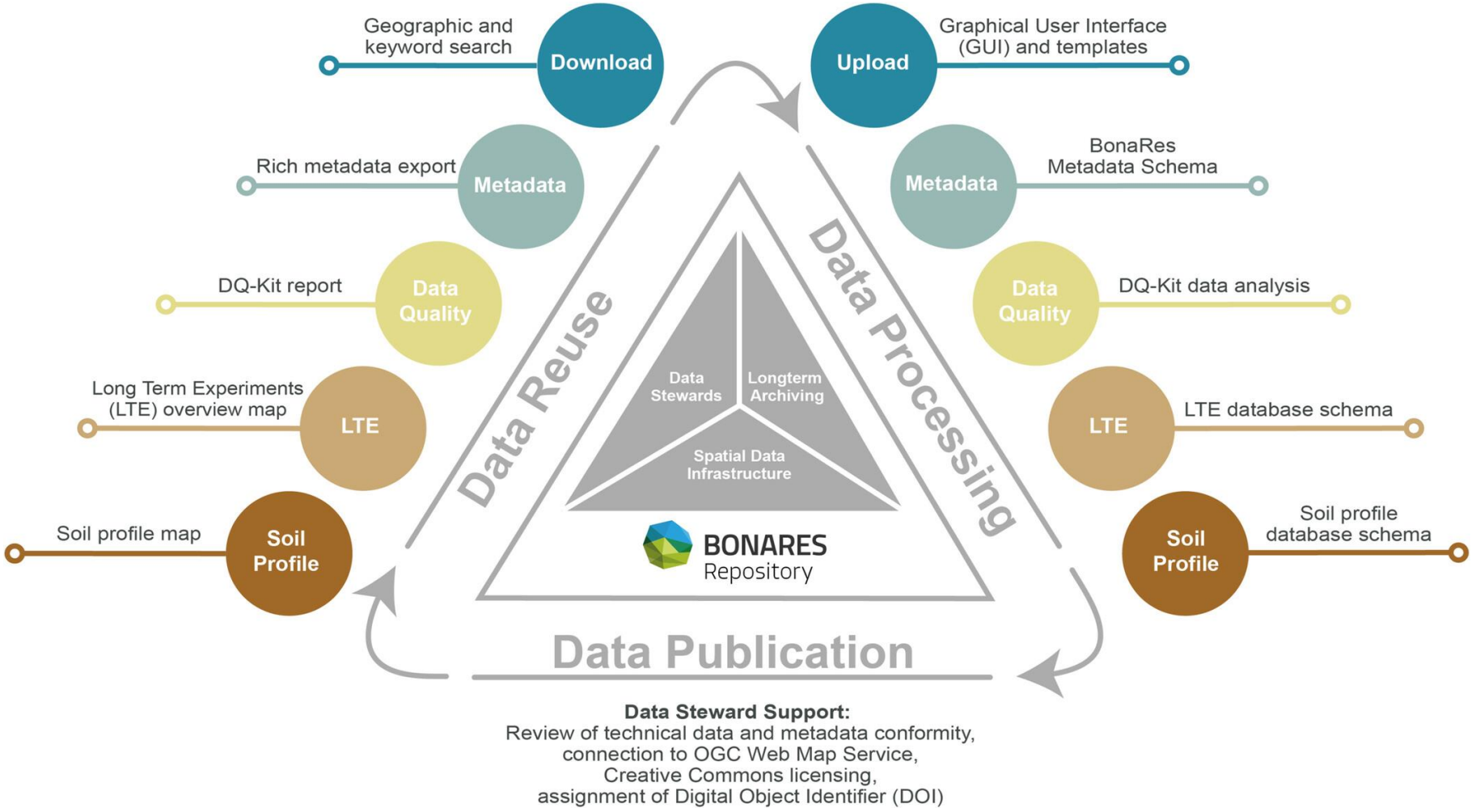


FDO – Fair Digital Objects -> Provenance Run Crates -> Annotated Research Contexts (ARCs)

The central component of the extended middleware is an **ARC-based GitLab infrastructure**, which will be used to register all public datasets provided by the FAIRagro RDIs.

García Brizuela, J., Scharfenberg, C., Scheuner, C., Hoedt, F., König, P., Kranz, A., Leidel, A., Martini, D., Schneider, G., Schneider, J., Singson, L.S., Von Waldow, H., Wehrmeyer, N., Usadel, B., Lesch, S., Specka, X., Lange, M., Arend, D., 2024. A roadmap for a middleware as a federation service for integrative data retrieval of agricultural data. Journal of Integrative Bioinformatics 21, 20240027. https://doi.org/10.1515/jib-2024-0027

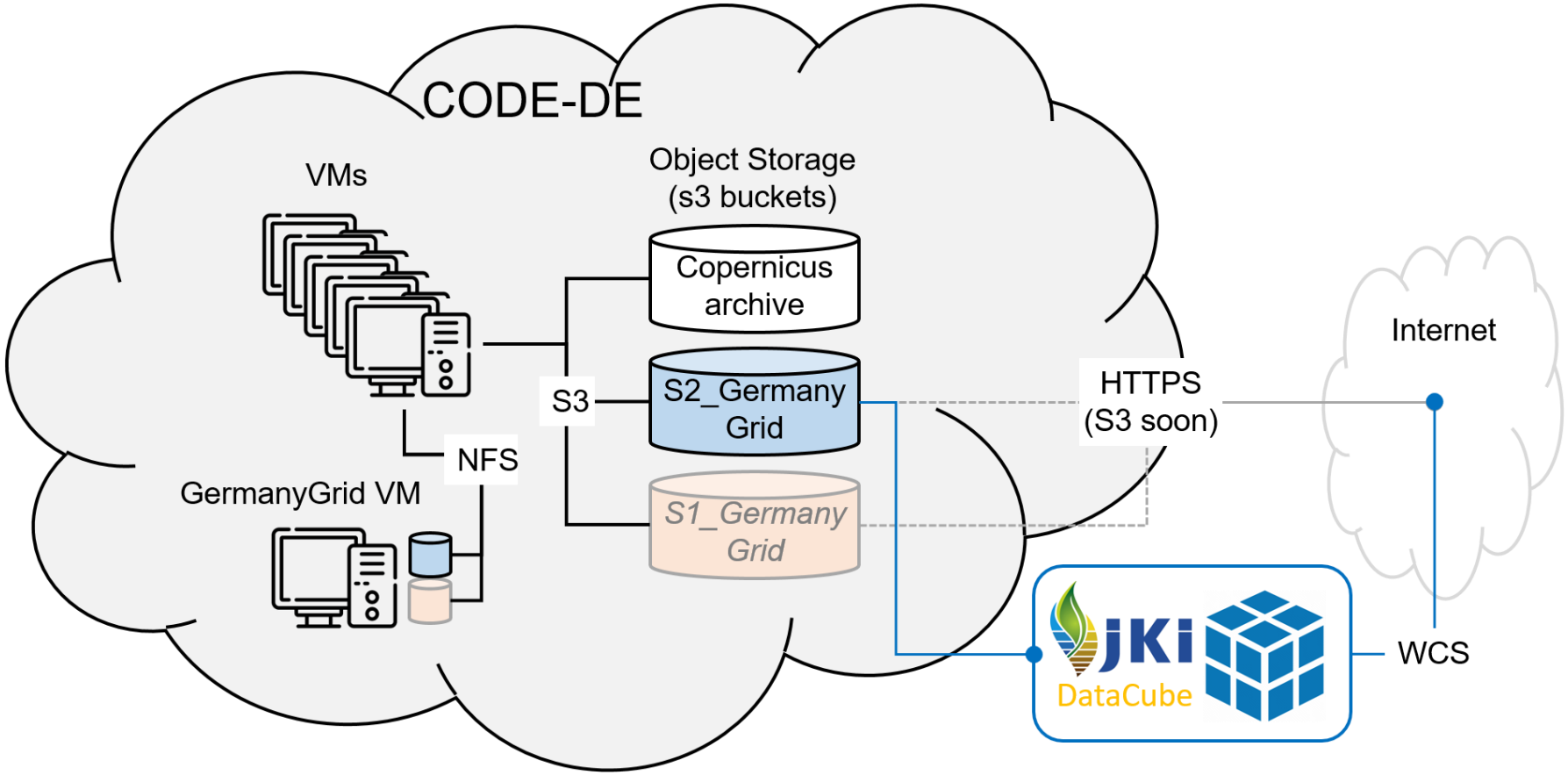
FAIRagro infrastructure: BONARES repository



Core (grey) and discipline-specific (coloured circles) infrastructures and services of the BonaRes Repository

Lachmuth, S., Dönmez, C., Hoffmann, C., Specka, X., Svoboda, N., Helming, K., 2025. Facilitating Effective Reuse of Soil Research Data: The BonaRes Repository. European J Soil Science 76, e70103. https://doi.org/10.1111/ejss.70103

FAIRagro infrastructure: JKI Data Cube



FAIR processes

Jupyter Notebook WC(P)S demo of JKI Data Cubes

Beyer, F., Möller, M., Dierks, M.,2024. JKIDataCubeDemo. Zenodo. https://doi.org/10.5281/zenodo.14215012

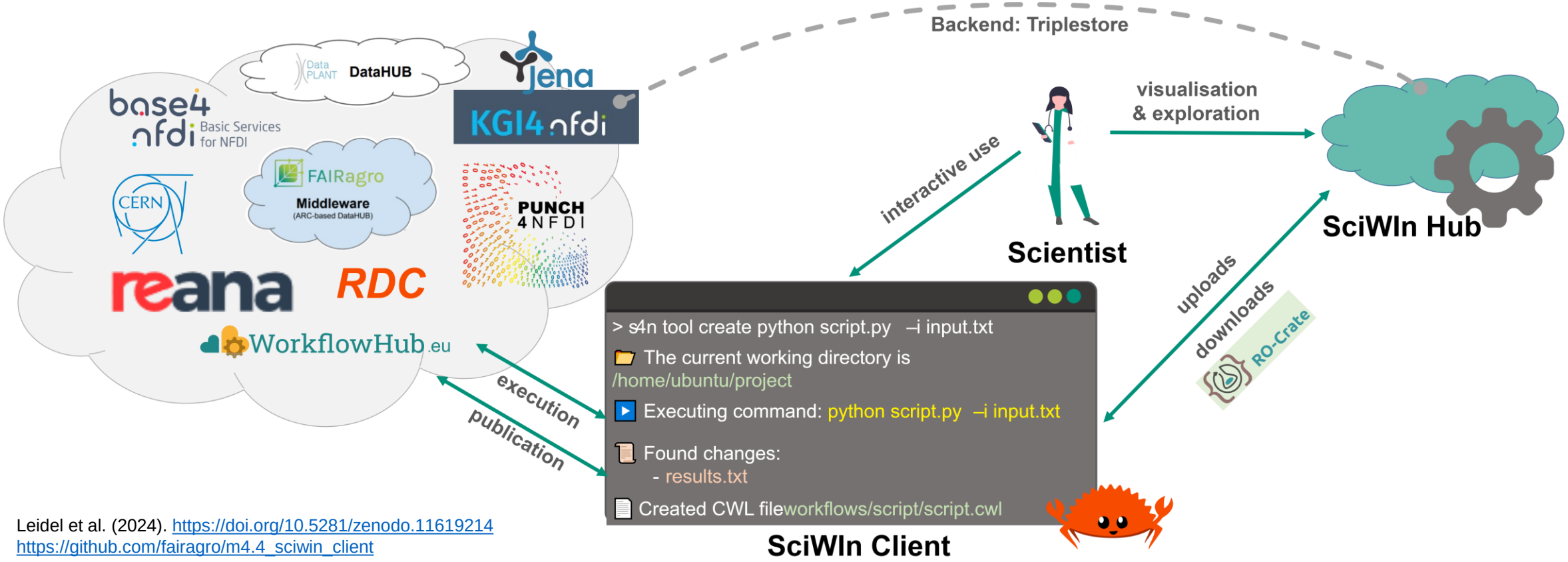
FAIR multidimensional data

OpenAPI WCS documentation

- https://sf.julius-kuehn.de/openapi/weather/
- https://sf.julius-kuehn.de/openapi/S2_GermanyGrid_JKI/
- https://sf.julius-kuehn.de/openapi/phase/

Beyer, F., Brandt, P., Schmidt, M., König, S., Stahl, U., Baumann, P., Golla, B., Gerighausen, H., Möller, M.,. Big geodata and spatial data infrastructures: A perspective of a German authority. under review in PFG – Journal of Photogrammetry, Remote Sensing and Geoinformation Science

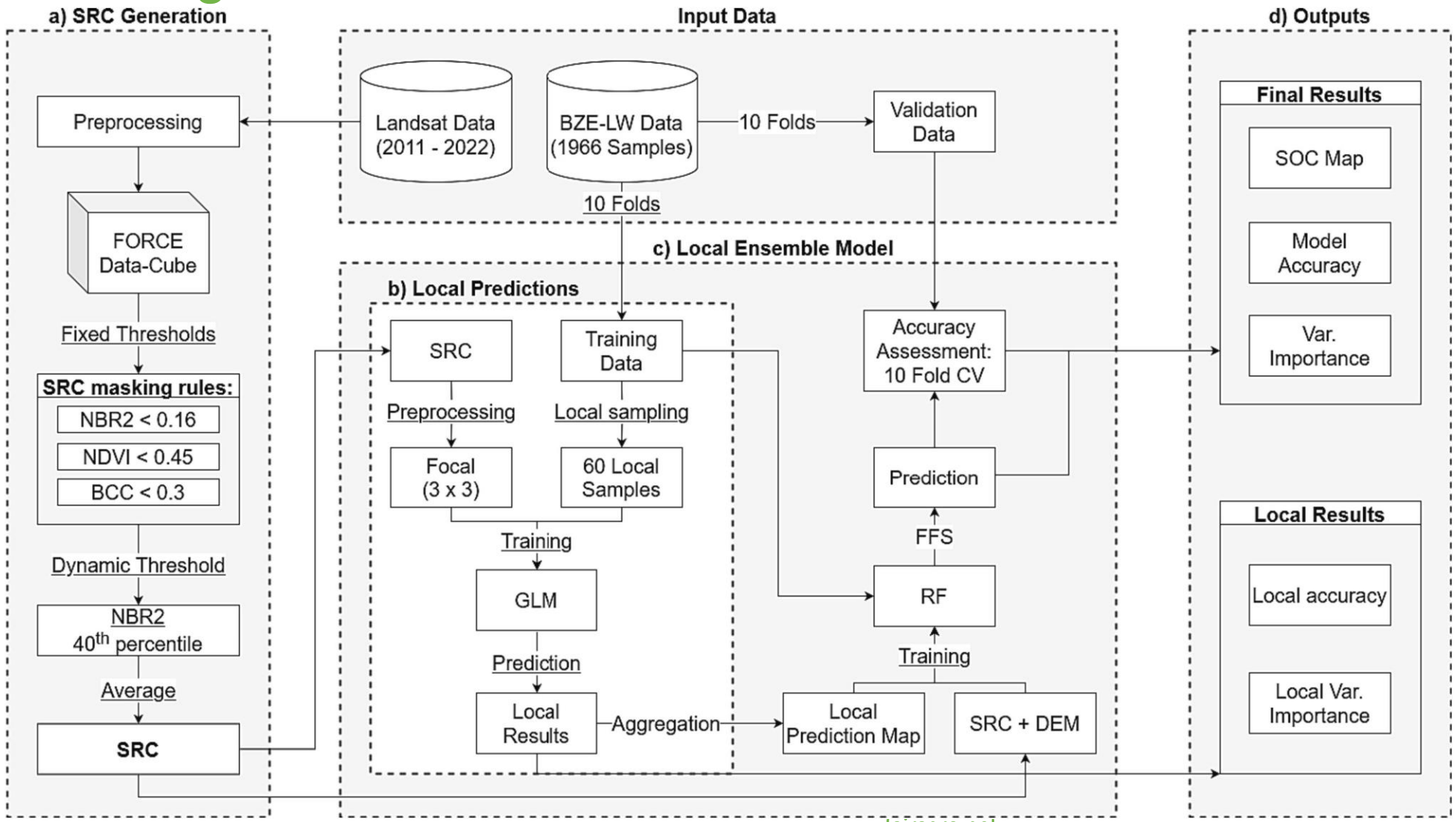
FAIRagro infrastructure: SciWIn client



Leidel et al. (2024). https://doi.org/10.5281/zenodo.11619214
https://github.com/fairagro/m4.4_sciwin_client

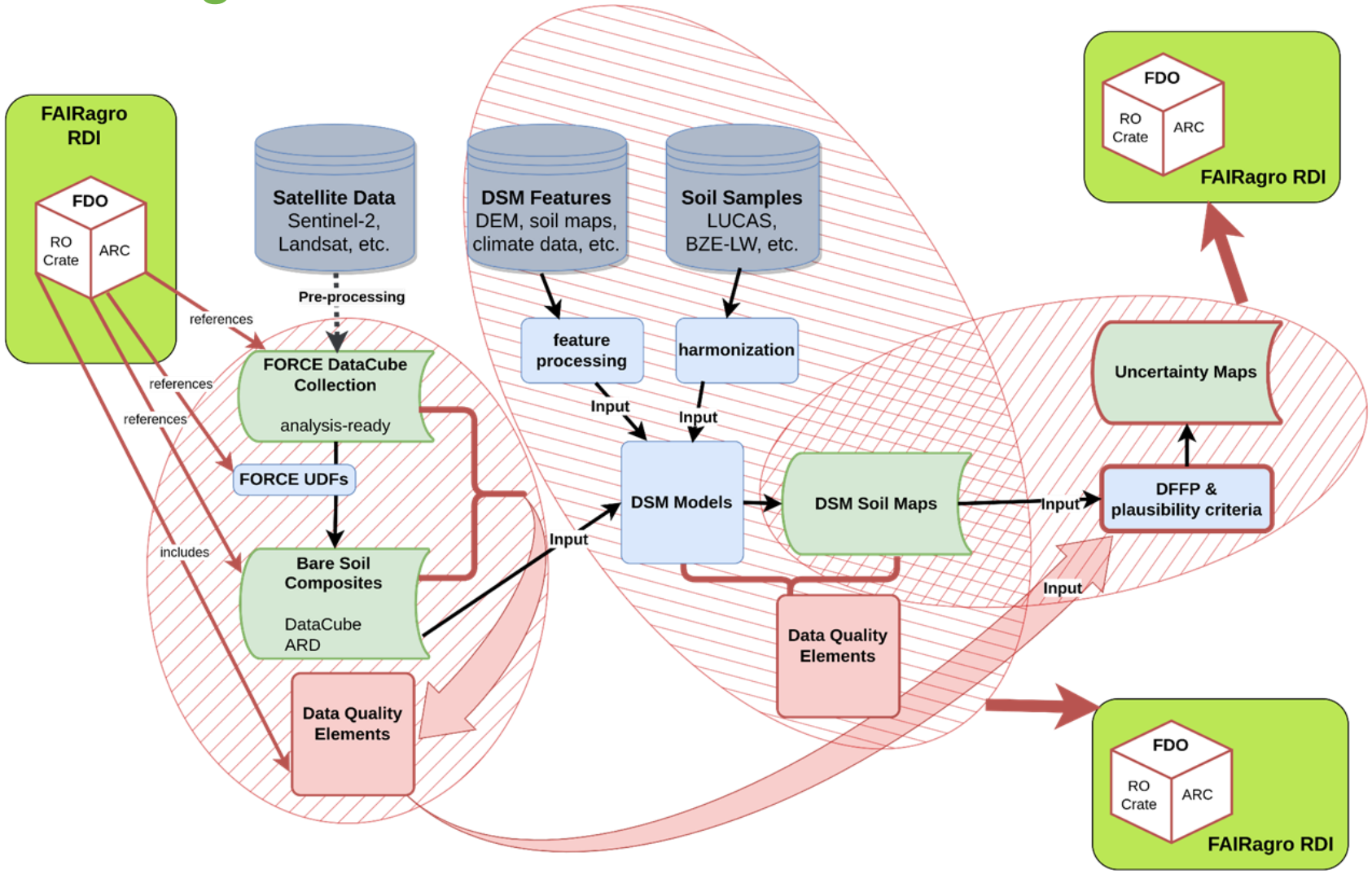
Computational workflows are essential for ensuring reproducibility, scalability, and efficiency in scientific research. The **FAIRagro Scientific Workflow Infrastructure (SciWIn)** supports scientists to create, execute, share, and publish these workflows, fostering collaboration and transparency.

FAIRagro infrastructure: SciWIn client



Broeg, T., Don, A., Gocht, A., Scholten, T., Taghizadeh-Mehrjardi, R., Erasmi, S., 2024. Using local ensemble models and Landsat bare soil composites for large-scale soil organic carbon maps in cropland. Geoderma 444, 116850. https://doi.org/10.1016/j.geoderma.2024.116850

FAIRagro infrastructure: SciWIn client

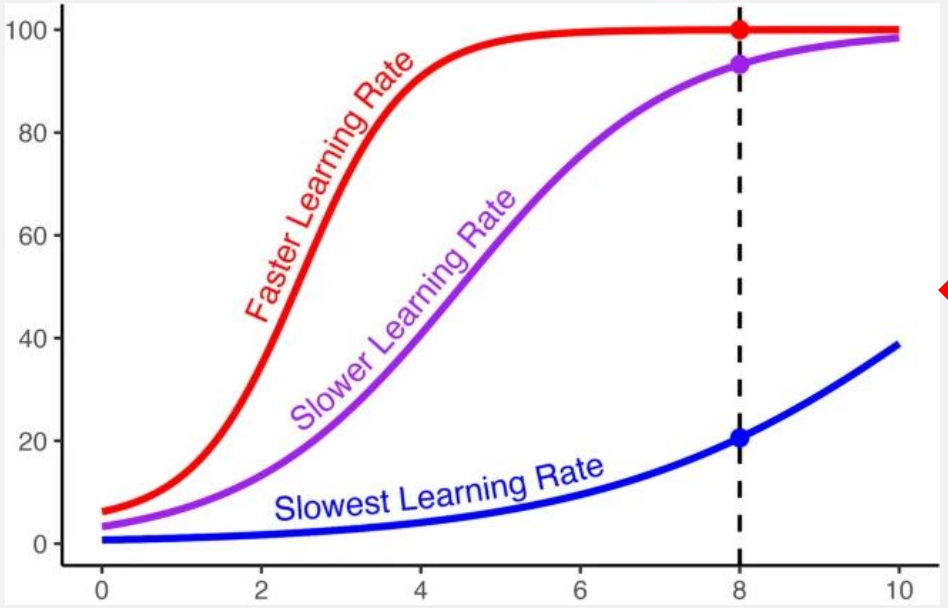


ReUseDSM: Boosting the re-usability of Digital Soil Mapping products: A blueprint for the reproducible creation of FAIR data-quality information

Scientific Workflow Infrastructure (SciWin) Client

RDI - FAIRagro-connected research data infrastructure
DSM – Digital Soil Mapping
FDO – Fair Digital Objects -> Provenance Run Crates -> Annotated Research Contexts (ARCs)

FAIRagro: Shortening the FAIR learning curve



Tools
Best Practice Examples

Schuetze, B.A., 2024. A Computational Model of School Achievement. Educ Psychol Rev 36, 18 (2024). https://doi.org/10.1007/s10648-024-09853-6

EGU25-17188 | Orals | ESSI2.7

Enhancing environmental indicator trustworthiness: A framework for user-specific quality assessment of spatial input data using data-fitness-for-purpose principles

Markus Möller, Claus Weiland, and Daniel Martini

Thu, 01 May, 11:45–11:55 (CEST) Room -2.92