FAIR Building Blocks

Definition

The Mission and vision of the HMC Hub Earth and Environment is realized by the **Road-to-FAIR-Strategy**. To do so, we suggest implementing a common set of **FAIR building blocks**. These building blocks are operational measures required to support the Findability, Accessibility, Interoperability, and Reusability of research data.

In our experience, the aspects Findability and Accessibility are relatively well supported by existing technical solutions in Earth and Environment. Directories of Repositories, like re3data.org, FAIRsharing.org, OpenAIRE and others allow to find thematical repositories and identify valuable datasets. The challenge lies in the constant maintenance of this information, to keep it accurate. Open access policies improved accessabilities of datasets within repositories. But even where open access is not yet standard procedure, the availability of metadata on restricted datasets has improved the accessability of relevant datasets very much. Therefore, our building blocks focus particularly on the aspects of Interoperability and Reusability.

Building blocks that mainly address **Interoperability** are:

- Common and agreed procedures to refer to systematically described entities through the use of **persistent identifiers (PIDs)**, to reduce redundancy, enrich context and improve consistency in referencing instances such as people, organizations, instruments, and datasets.
- Common understanding across systems and disciplines through the coordinated use of **semantic artefacts** to standardize metadata element names and reduce ambiguity.
- Common methods to structure (meta)data through the application of **interfaces, protocols, exchange formats, and schemas**, to ensure a smooth exchange of metadata across systems.
- Common data dissemination through **self-describing data packages** such as FAIR Digital Objects or DataCrates, to enable machine-actionable reuse and portability.

The following building blocks mainly address **Reusability**:

- Inclusion of **provenance information**, capturing data origin, transformation steps, and responsible agents, to disclose lineage, and enable assessment of data reliability and reproducibility.
- Standardized procedures for documenting and assessing **data quality**, including uncertainty, validation, completeness, and versioning, to establish a basis for data trust and ensure data are fit for purpose.
- Clear definition of **access and use constraints** using standardized and machine-readable methods, e.g. common licenses, to promote legal clarity.

These building blocks form the structural foundation for the detailed recommendations presented in this wiki.

Furthermore, the wiki contains concrete recommendations for implementing our recommendations, combined with the documentation of positive use cases.

Finally, we present guidance tailored to the various stakeholders who are or need to be involved in

implementig FAIR.

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