Introduction

The Character of This Wiki

This wiki serves as the collaborative working platform of the Helmholtz Metadata Collaboration (HMC) Hub Earth and Environment. It is conceived as a living resource that reflects the current perspectives, discussions, and activities of the Hub and its wider community. Its content is continuously refined as new requirements emerge, implementation experience is gained, and community agreements evolve.

The wiki primarily supports the development, discussion, and documentation of concepts and recommendations. More formalized outcomes derived from this work are published through the central HMC website, the website of the HMC Hub Earth and Environment, or other appropriate publications and resources.

The Helmholtz Metadata Collaboration

The Helmholtz Metadata Collaboration promotes the qualitative enrichment of research data through high-quality metadata and supports the implementation of this approach throughout the Helmholtz Association.

HMC develops and implements concepts, services, and technologies for the sustainable management of research data. Its principal objective is to ensure that the breadth and depth of research data produced by the Helmholtz Centres can be discovered, accessed, interpreted, and reused by the wider scientific community in accordance with the **FAIR Guiding Principles** [1]. The objective of enabling FAIR research data across the Helmholtz Association is also reflected in the **Recommendations for Policies of the Helmholtz Centres on Research Data Management** [2].

Research data, metadata, information, and knowledge systems are created and maintained by a wide range of individuals, institutions, and stakeholder groups. The establishment of a harmonized, interoperable, and ultimately FAIR research data space therefore requires the alignment of practices, responsibilities, and technical processes across heterogeneous data infrastructures. Such alignment must be implemented not only within technical systems but also through the coordinated activities of the people and organizations responsible for producing, managing, curating, and providing access to research data. The Road-to-FAIR Strategy provides the framework through which these technical, organizational, and procedural aspects can be coordinated and translated into actionable recommendations.

The Content of This Wiki

Within this wiki, the HMC Hub Earth and Environment and its partners from the Helmholtz DataHub Earth and Environment formulate recommendations aligning research data management practices across the Earth and Environment community. The wiki translates general objectives into concrete implementation guidance and documents the recommendations developed through the Road-to-FAIR

Strategy.

The Road-to-FAIR Strategy provides the overarching framework for identifying shared requirements, developing implementation measures, and coordinating their adoption across heterogeneous infrastructures. Its structure and individual components are described in the dedicated Road-to-FAIR Strategy chapter.

As an initial step, existing data infrastructures and their interfaces are examined in order to identify established practices, recurring challenges, and approaches that may serve as transferable models. On this basis, relevant committees and stakeholder groups collaborate to define implementation measures for specific objectives. For each agreed Road-to-FAIR building block, concrete recommendations are developed and documented. These recommendations are presented in this wiki as part of a living handbook and are revised as technical environments, community practices, and institutional requirements evolve.

To support consistency and transparency, recommendations are documented according to a common structure and a shared set of guiding questions. Their development considers two complementary perspectives: the substantive discussion and community agreement concerning the intended outcome, and the organizational, administrative, and technical measures required for its implementation.

Each step necessary for implementation must therefore be examined individually. The perspectives, responsibilities, and requirements of the relevant stakeholder groups are considered in order to identify dependencies and influencing factors. The processes through which procedures are discussed, agreed upon, and established are also documented, including both bottom-up processes originating within communities and infrastructures and top-down processes arising from institutional strategies and policies.

This approach provides a basis for clarifying and improving procedures, responsibilities, and required actions. The successful implementation of FAIR practices ultimately depends on the active participation of the identified stakeholders and on their willingness and ability to assume clearly defined responsibilities.

Contributions

The contributors to this wiki are

- HMC Hub Earth and Environment
- Working group Arbeitskreis Metadaten
- Working group Arbeitskreis Semantik

Both working groups are formed by the HMC Hub Earth and Environment and the DataHub Earth and Environment.

For questions, comments and suggestions, please write to hmc-hub_ee@geomar.de.

References

[1] Wilkinson, M. D. et al. The FAIR Guiding Principles for scientific data management and stewardship. Sci. Data 3:160018 doi: 10.1038/sdata.2016.18 (2016)

[2] Empfehlungen für Richtlinien der Helmholtz-Zentren zum Umgang mit Forschungsdaten, 2019, Helmholtz Open Science, https://os.helmholtz.de/open-research-data/forschungsdaten-policies/ doi: doi.org/10.2312/os.helmholtz.002

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