

Recommendation S0

# Recommendation for implementing harmonized semantic concepts in data infrastructures and products

## Description

Status: Under development, Date: 2025/05/07 10:18, Version: 001

## Motivation for this Recommendation:

Using shared, community-endorsed vocabularies enables unambiguous naming, supports the alignment and integration of heterogeneous datasets, and facilitates data discovery and reuse. Within the framework of the FAIR Guiding Principles (Wilkinson et al., 2016), such annotation practices are essential not only for improving interoperability — by enabling machines to interpret and connect data across domains — but also for enhancing findability and reusability through the use of persistent, well-defined, and widely recognized semantic references. Moreover, applying standardized vocabularies contributes to transparency and traceability in data management, fostering reproducibility and trust in scientific workflows. To support these goals, metadata creation processes should systematically incorporate controlled vocabularies that are maintained according to community standards and have clear governance, provenance, and documentation.

## Recommendation:

Data infrastructures should ensure the annotation of the large majority of metadata using standardized terms within metadata systems — such as data repositories, sensor registries, electronic lab notebooks, or other platforms that manage or reference data, including descriptions of files stored outside formal repositories — at the time of metadata creation or management, by applying terms from established and, where applicable, FAIR-compliant controlled vocabularies (e.g., ontologies, taxonomies, or standardized terminologies) to promote semantic consistency, clarity, and interoperability.

## Binding Convention:

	mandatory	conditional	optional
Helmholtz FAIR Principle			

## Precondition for Implementation:

## Related Recommendations

Parent:

Dependent:

Other: none

## Contributors

Names of contributors to this recommendation

## Content

### 1. Explanation of the Background and Benefits of the Recommendation

[About](#)

[History and structure](#)

[Current Use of ...](#)

[Motivation](#)

### 2. Possible alternative solutions

### 3. Consideration of the advantages and disadvantages of implementing the recommendation

(quality of content, limitations, interoperability, sustainability: expected future dissemination / technical availability / funding)

### 4. The Recommendation

Data infrastructures should ensure the annotation of the large majority of metadata using standardized terms within metadata systems — such as data repositories, sensor registries, electronic lab notebooks, or other platforms that manage or reference data, including descriptions of files stored outside formal repositories — at the time of metadata creation or management, by applying terms from established and, where applicable, FAIR-compliant controlled vocabularies (e.g., ontologies, taxonomies, or standardized terminologies) to promote semantic consistency, clarity, and

interoperability.

## 5. Naming of communities that have already implemented the recommendation

## 6. Documentation of the test to validate correct implementation

## 7. Examples of Instances

## 8. Further Information

### References

### Relevant Community Recommendations

## 9. History of this document

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