



Data Integration & Semantic Alignment Across Disciplines with *NFDIcore*

MOTIVATION

Research data in NFDI originates from **heterogeneous, multi-disciplinary sources**. The resulting lack of interoperability is one of the core challenges in modern research data infrastructure management.

WHAT IS NFDIcore?

NFDIcore — a mid-level ontology

Provides a *shared, minimal, and stable semantic backbone* for the German National Research Data Infrastructure (NFDI). It encodes metadata about:

Research Data Agents Projects Services Guidelines

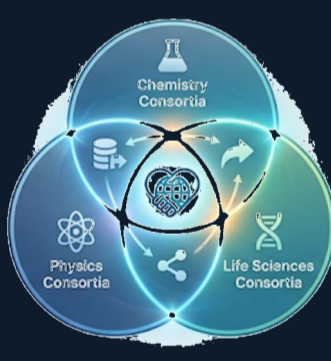
KEY FEATURES



Unified framework for data management, organisation & integration across all scientific disciplines



Modular architecture — serves as the stable base for domain-specific ontological extensions



Enables data sharing, reuse & interdisciplinary collaboration across NFDI consortia

ARCHITECTURE

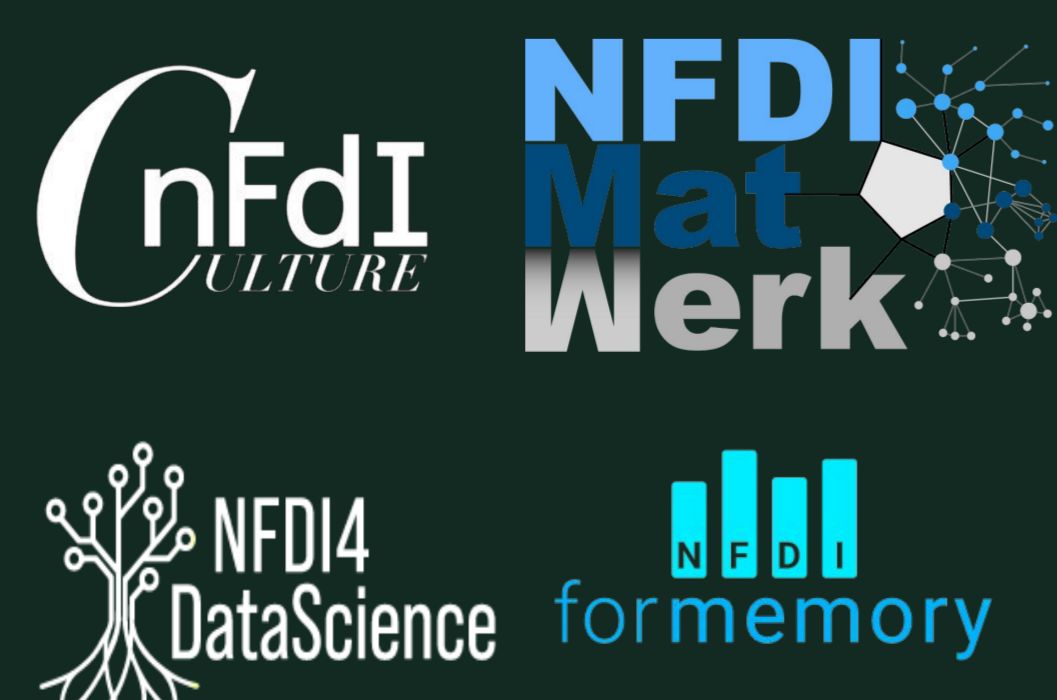
Foundational Ontology
Basic Formal Ontology

Mid-Level Ontology
NFDIcore

Use Cases



Domain Extensions



Application Extensions

ML Module

Provenance Module

DOMAIN-SPECIFIC ONTOLOGIES

Each consortium extends NFDIcore into its specialised scientific domain, enabling interoperability while preserving domain-specific semantics.

| Ontology | Domain | Focus |
|--------------------------|---------------------|---|
| CTO NFDI4Culture | Cultural Heritage | Decentralised access to cultural heritage resources and artefacts |
| MEMO NFDI4Memory | Historical Sciences | Metadata harmonisation and provenance representation |
| DSAI NFDI4DataScience | AI & Data Science | AI research lifecycle: datasets → models → publications |
| MWO NFDI-MatWerk | Materials Science | Lifecycle annotation and integration for materials science data |

CURRENT EXPANSION

Broader Interoperability via DCAT-AP+

NFDIcore is being mapped to **DCAT-AP+** (Data Catalog Vocabulary with a provenance layer), enabling broader interoperability, interdisciplinary data reuse, and knowledge transfer with full provenance details.

