

# The NFDICore Ontology And Related Modular Domain Ontologies For NFDI4Culture - NFDI-MatWerk - NFDI4DataScience - NFDI4Memory And Beyond

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## Abstract:

Each NFDI consortium works on establishing research data infrastructures tailored to its specific domain. To facilitate interoperability across different domains and consortia, the NFDICore ontology [1,2,3] was developed and serves as a mid level ontology for representing metadata about NFDI resources such as individuals, organizations, projects, data portals, etc. Recognizing the diverse needs of consortia, NFDICore establishes mappings to a wide array of standards across domains, including the Basic Formal Ontology (BFO) [3], schema.org, DCTERMS, and DCAT, which is crucial for advancing knowledge representation, data exchange, and collaboration across diverse domains.

Aligning with the Information Artifact Ontology (IAO) [4] and Schema.org, NFDICore focuses on describing 3 main concepts:

1. Digital Information Artifacts (nfdicore:Resource), e.g. data sets, data portals, publications, services, software, etc.
2. Independent Continuants that act autonomously (nfdicore:Agent), e.g. organizations and persons
3. Planned processes and events, e.g. nfdicore:Project, nfdicore:Contributing, nfdicore:Event.

To answer domain-specific research questions, NFDICore [5,6] is extended following a modular approach, as e.g. with the NFDI4Culture ontology module (CTO) [7], the NFDI-MatWerk ontology module (MWO) [8] or the currently developed NFDI4DataScience ontology module (NFDI4DSO) [9] and NFDI4Memory ontology module (MO). Current development is managed via [GitHub](#).

[The NFDI4Culture Ontology \(CTO\)](#) is designed to represent and categorize resources within the NFDI4Culture domain, which encompasses five academic disciplines: Architecture, Musicology, Art History, Media Science, and the Performing Arts. CTO defines classes and

properties that address domain-specific research questions, connect diverse cultural entities, and facilitate the efficient organization, retrieval, and analysis of cultural data.

The MatWerk ontology (MWO) serves as the backbone for the materials science and engineering knowledge graph (MSE-KG). The data represented focuses on (i) relevant community structure: researchers, research projects, universities, and institutions; (ii) infrastructure: software, workflows, controlled vocabularies, instruments, facilities, educational resources, and events; and (iii) data: repositories, databases, scientific publications, published datasets, and reference data.

[The NFDI4DS ontology \(NFDI4DSO\)](#) describes all resources in the NFDI4DS data science domain and will serve as the basis for the NFDI4DS-KG, which will include the Research Information Graph (RIG) for metadata on resources and the Research Data Graph (RDG) for content-related index data, as e.g., metadata for training datasets and machine learning models.

The NFDI4Memory module is currently in development and in a first stage captures information about research structures within the consortium, including archives, libraries, museums, and other university institutions.

The mid-level NFDIcore ontology represents metadata about NFDI resources with the goal to facilitate interoperability across different domains and consortia.

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