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Towards a Common Metadata Framework for FDOs in NFDI: From Kernel Profiles to Semantic Cross-Walks

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Abstract.

The transition from isolated data silos to a truly interconnected research data ecosystem depends on two pillars: metadata harmonisation and a robust identifier infrastructure. Implementing FAIR Digital Objects (FDOs) within the German National Research Data Infrastructure (NFDI) therefore requires more than shared principles, it demands operational alignment between metadata schemas, persistent identifiers, and semantic services.

This contribution presents a workflow-driven implementation concept that aligns the FDO Kernel Profile with the DataCite Metadata Schema, establishing a practical pathway for interoperable, machine-actionable FDOs within NFDI. The kernel profile defines the minimal set of attributes, identifier, type, profile, creation date, and provenance, that make an FDO findable, resolvable, and reusable across domains. By mapping these kernel attributes directly to the DataCite schema, the approach leverages an existing, globally recognised metadata infrastructure to support PID/FDO Profiles and type registries with minimal additional overhead.

Cross-domain interoperability is further enabled through the Metadata Schema and Crosswalk Registry (MSCR), which manages and versions schema cross-walks, and the TS4NFDI Terminology Service Suite, which provides the semantic layer for harmonising vocabularies and maintaining conceptual consistency across mappings. Together, these components operationalise FDO interoperability: a digital object described in one schema can be automatically translated and resolved in another without loss of meaning.

Supported by PID4NFDI and DataCite, this implementation blueprint demonstrates how FDO concepts can be embedded within existing metadata and PID ecosystems to achieve scalable, standards-based interoperability. It represents a step toward a cohesive, machine-actionable foundation for the NFDI, one that turns FDO principles into operational reality through coordinated schema mappings, semantic alignment, and kernel compliance.

Relation to FDO concept: Implementation of FDO Kernel Profile and interoperability infrastructure.

Type of contribution: Implementation concept and workflow.

Intended format: Presentation or lightening talk