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Three Use Cases on Adoption of Webby FDOs

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Abstract. FAIR Digital Objects (FDOs) extends FAIRness with a clear separation between data and metadata and typing, together with layers regarding PIDs and operations, making it easier for researchers and machines to access machine-actionable research artifacts. Webby FDOs have emerged as an FDO implementation, as its adoption becomes natural to those familiar with Linked Open Data and Semantic Web. Here we present three adoption stories in Germany.

Keywords: Webby FDO, FAIR Signposting, RO-Crate, NFDI

1. Introduction

Four years have passed since Linked Open Data (LOD) practices were proposed as an alternative to realize FAIR Digital Objects (FDOs) [1] and two years since FAIR Signposting [2] plus Research Object Crate (RO-Crate) [3] were presented as a powerful combination to implement FDOs [4]. It was during the FDO Summit in 2024 where the term “Webby FDOs” was coined [5,6]. While RO-Crate provides a lightweight way to package research outputs together with their metadata, Signposting makes it easy to navigate scholarly objects on the Web by pointing to their metadata. Combining these technologies form a “webby” implementation of the FAIR Digital Object principles, very suitable for data infrastructures already familiar with LOD practices and aligned to either RO-Crate or Signposting. Here we present three exemplary adoptions of Webby FDOs in Germany.

2. Adoption of Webby FDOs

OneStop4Wildlive. OneStop4WildLIVE is a platform developed by Senckenberg in cooperation with Hochschule Darmstadt for managing and analyzing large-scale audiovisual biodiversity monitoring data from camera traps [7]. The platform addresses the challenge of managing and processing the large volumes of data generated by deployed biodiversity monitoring sensors. The platform employs the Wildlife Monitoring Ontology [8], an ontology built upon community standards including the Web Annotation Ontology [9] and Semantic Sensor Network Ontology [10], to describe captured wildlife monitoring events and related infrastructure. Data is packaged using detached RO-Crates, which describe individual capture events with their associated metadata, including taxonomic classifications, licensing information of raw data, and authorship. The platform implements FAIR Signposting to

advertise these RO-Crates, individual images within capture events, and provenance metadata through HTTP link headers.

workflow.earth. workflow.earth is a FAIR workflow platform [11] developed by Senckenberg to facilitate the execution of machine-actionable workflows and the mobilization of resulting research data as FDOs. The platform aims to automate provenance tracking and the FAIRification process by generating FAIR-compliant datasets from executed workflows. workflow.earth leverages Workflow Run RO-Crates (WRROCs) to package workflows together with their execution outputs and provenance metadata. The platform makes datasets available by implementing FAIR Signposting on dataset landing pages to advertise machine-actionable RO-Crates, which are built by the platform dynamically at request time, enabling efficient delivery of large datasets while maintaining FAIR compliance. Provided metadata includes the workflow specification, execution parameters, author information, licensing and execution provenance data. workflow.earth is deployed within the Destination Earth Data Lake [12], where it powers the Agrobiodiversity Digital Twin for Crop Wild Relatives [13] as part of the BioDT project [14]. This deployment demonstrates how FAIR workflows can integrate biodiversity data from GBIF with Earth observation data to address agrobiodiversity challenges. Additionally, workflow.earth serves as a backend execution engine for workflows submitted through virtual research environments in the Biodiversity meets Data project [15], demonstrating its versatility across different biodiversity informatics contexts.

MLentory. MLentory is a registry for Artificial Intelligence(AI) models [16] developed as part of the German National Research Data Infrastructure for Data Science (NFDI4DS). It aims at enhancing findability, comparability and reusability of AI models by aggregating and harmonizing metadata from various repositories (e.g., HuggingFace [17], OpenML [18], AI4Life/Bioimage Model Zoo [19]). MLentory relies on an Extraction, Transformation and Loading (ETL) pipeline to process data, which is then expressed as metadata using e.g., schema.org [20], Croissant ML [21], and FAIR4ML metadata schema [22]. MLentory also supports Webby FDOs by adding Signposting to landing pages for each model using Link headers, in particular declaring the type fair4ml:MLModel and pointing to a metadata description compliant to the RO-Crate profile. Metadata about the model includes name, description, authorship, licensing, trained and evaluation datasets, and links to associated research artifacts. Currently, one of the limitations in MLentory RO-Crate is the provision of an actual bite sequence (or file) corresponding to the model as it is not easy to get from the original sources and could be too big for downloading. Improving access to downloads and RO-Crate provenance are the current focus of ongoing developments.

3. Conclusions and future work

We have here summarized three use cases showcasing the adoption of Webby FDOs in Germany, showing their acceptance in the German National Research Data Infrastructures (NFDI), in particular NFDI4Earth, FAIRagro, NFDI4Biodiversity, and NFDI4DataScience. We will continue promoting and facilitating adoption of Webby FDOs in NFDI and beyond.

Data availability statement

This submission is not directly on data as it reports on advances and news from the past two years for Webby FDOs.

Underlying and related material

Demo presented in CoRDI 2026 about Webby FDOs adoption in NFDI DOI:10.5281/zenodo.16735336

Author contributions

LJC, SSR, and CW have contributed to conceptualization, supervision, and funding acquisition. JG, DB, RR have contributed to software. DB, RR, and LJC have contributed to writing –original draft and review & editing.

Competing interests

The authors declare that they have no competing interests.

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