

 | FAIR-IMPACT
Expanding FAIR solutions across EOSC

 | FAIRCORE4EOSC
Core Components Supporting a FAIR EOSC

A for Accessibility: Semantic Artifacts

Chairs: Clement Jonquet, Joonas Kesäniemi

FAIRfest 20 February 2025
The Hague, The Netherlands (Madurodam)

Celebrating the advancements in FAIR solutions for EOSC

Welcome & Agenda

14:00 - 14:05	Introduction to the session	Clement Jonquet, <i>INRAE</i>
14:05 - 14:20	A is for Access: not just protocols, semantics matter! Keynote	Carole Goble, <i>University of Manchester</i>
14:20 - 14:30	Research Software MetaData (RSMD) guidelines, the CodeMeta standard and the RSAC services	Morane Gruenpeter, <i>Software Heritage</i>
14:30 - 14:40	FAIR mappings recommendations and the MSCR service	Yann Le Franc, <i>e-Science Factory</i> & Joonas Kesäniemi, <i>CSC</i>
14:40 - 14:50	FAIR Semantic Artefact and their Catalogues	Clement Jonquet, <i>INRAE</i>
14:50 - 15:00	DTR on the roadmap of implementing FDOs	Hans Lienhop, <i>GDWG</i>
15:00 - 15:30	Panel Discussion	Clement Jonquet (moderator) Morane Gruenpeter Yann Le Franc Joonas Kesäniemi Baptiste Cecconi Sophie Aubin Carole Goble

Any Questions? Submit them on Mentimeter!

Join at menti.com!

Use code **6927 7068**



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Introduction

Clement Jonquet, INRAE

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 | **FAIRCORE4EOSC**

'A' for Accessibility: Semantic Artefacts

Clement Jonquet

clement.jonquet@inrae.fr

FAIRfest (FAIR-IMPACT & FAIRCORE4EOSC final
project meeting)

The Hague, February 20th 2025

transformative contributions of FAIR-IMPACT
and FAIRCORE4EOSC projects to **advancing
FAIR principles in the domain of semantics:**
metadata & ontologies, mappings, and
research software

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Greater and more harmonised use of **semantic artefacts** throughout the EOSC ecosystem, leading to semantic interoperability **within and between disciplines.**

WP4 work on Semantic Artefact and their Catalogues

*WP4 will develop and foster the uptake of a semantic **framework** for the governance, creation, mapping, sharing, reuse, FAIRness assessment and interoperability of **semantic artefacts** for EOSC.*

Main focus of FAIR-IMPACT's WP4

*...implementation
of FAIR-enabling
practices across
communities and
research outputs*



WP4's use cases include

- Agri-food (INRAE with AgroPortal, EMPHASIS, ANAEE)
- Ecology/biodiversity (LifeWatch with EcoPortal)
- Earth sciences (CNRS with DataTerra EarthPortal)
- Photons and neutrons (UKRI-STFC)
- Social sciences and humanities (DANS)
- Astronomy (Obs. Paris)

*...projecting
the FAIR
principles to
other types of
research
objects*

WP4's research
objects



**Semantic
Artefact**



**Mapping
& Crosswalk**



**Research
Software**

Our work on Semantic Artefacts and their Catalogues

- Existing catalogues being consolidated in communities
- New catalogues being deployed in other communities/projects
- Semantic Artefact « FAIR-by-design » methodology
- FAIReabling tools and methods being transferred
- Exhaustive review of current and retired catalogues and FAIR-enabling criteria
- Catalogues being exploited in data repositories (9 use cases)
- A metadata standard for semantic artefacts (MOD)
- A standard API for semantic artefact catalogues (MOD-API)
- Early work on federation of 4 catalogues
- 3 possible models for semantic artefact governance
- Toward specifications for FAIR mappings



Semantic Artefact
Catalogues



Semantic Artefact



Mappings

FAIR-IMPACT's WP4 in the Marketplace

- Find Guillaume, Nina, Baptiste, Morane, Yann, Carole and me

Metadate & Ontologies Outcomes & Use cases
This work package gathers, synthesises and disseminates the materials needed to federate the approach to metadata and ontologies at various organisational and technical levels within EOSC.

Semantic Artefact Governance

- Build on **Linked Open Terms** methodology
- Establish **FAIR guidelines** & develop an harmonised mechanism to describe SA with **Metadata Ontology Description**

Semantic Artefact Catalogues

- Build on existing **tools & technologies** (e.g. Agronomix, Ontoportal)
- Review and analyse **Semantic artefact catalogues & technology landscapes**
- Develop **FAIR-enabling criteria & support implementation** into free communities

Our research objects

Do you know what we are developing for Semantic Artefacts in EOSC ?

Semantic Artefact Mappings

- Build on **community survey & workshops**
- Review and analyse **Practices & needs**
- Propose **Guidelines of metadata standard** for research specifications

Metadata for Research Software

- Build on **multiple use cases**
- Review **Software metadata landscape**
- Propose **Guidelines of metadata standard** for research software

Semantic Artefacts in used within Data Repositories

- Build on **multiple use cases**
- Facilitate **use of semantic artefacts** into disciplines data repositories
- Develop **Semantic connectors** between data repositories & semantic artefact catalogues

FAIRness assessment

- Build on **recognized FAIR tools & methods**
- Implement and foster **FAIRness of semantic artefact** among multiple communities

Deliverables and milestones

- **SA1** - Semantic artefact governance model and disciplinary approaches for inclusion within EOSC
- **SA2** - Processes & tools to engineer FAIR semantic artefacts
- **SA3** - Specification of shared metadata description of semantic artefacts and their catalogues including common reference API
- **SA4** - Review of Semantic Artefact Catalogues and guidelines for serving FAIR semantic artefacts in EOSC
- **SA5** - Guidelines for recommended metadata standard for research software within EOSC

Follow us on our channel



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‘A’ for Accessibility:
Semantic Artefacts

PANEL

Panelists

Clement Jonquet (moderator)

Joonas Kesäniemi (moderator)

Morane Gruenpeter

Yann Le Franc

Baptiste Cecconi

Sophie Aubin

Carole Goble

Tommi Suominen



Questions

- What was your perspective before FAIR-IMPACT / FAIRCORE4EOSC and how has it evolved 5 years later? (with or without our contributions)
- What results from FAIR-IMPACT / FAIRCORE4EOSC do you see as defining milestones for the future of semantics within EOSC?
- Starting from the EOSC SRIA (v1) and Interoperability Framework requirements, have we achieved something useful?

Questions

- FAIR-IMPACT focused heavily on FAIR principles and semantics (symbolic AI approaches) during a time of rapid advancements in data science and statistical AI. How do you see these approaches complementing one another?

Questions

- FAIR-IMPACT: what didn't go as planned? If we could start over, what would we do entirely differently? Are there opportunities or challenges we may have overlooked?
- What research directions should we explore in this knowledge and semantic landscape? Any trends, ideas, or intuitions?

Questions

- Semanta: How can we ensure the long-term sustainability of the outcomes produced related to Semantic Artefacts?
- Where do we go next?

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A is for Access: not just protocols, semantics matter!

Carole Goble, University of Manchester

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A is for Access

not just protocols: semantics matter!

Professor Carole Goble
The University of Manchester, UK
ELIXIR Research Infrastructure for Life Sciences, UK Head of Node
Health Data Research UK
Software Sustainability Institute UK
European Virtual Institute for Research Software Excellence
FAIR-IMPACT

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Celebrating the advancements in FAIR solutions for EOSC



"That's the hard one to talk about"

"A is the boring one"

"semantics is more about FIR than A"

The Turing Way project illustration by Scriberia. Used under a CC-BY 4.0 licence. DOI: [10.5281/zenodo.3332807](https://doi.org/10.5281/zenodo.3332807)



Accessibility is the most important part of FAIR

Without access to the object, does the object exist?

No object archives, what will you access?

The Turing Way project illustration by Scriberia. Used under a CC-BY 4.0 licence. DOI: [10.5281/zenodo.3332807](https://doi.org/10.5281/zenodo.3332807)



F serves A
user finds the data or software, they need to know **HOW** to access it, and **CAN** they access it.

I and R depend on A
Reuse: usage license to ACCESS

<50% researchers license their data/software (161 respondents – Meznah Aloqalaa)

No licensed use, access is devalued

The Turing Way project illustration by Scriberia. Used under a CC-BY 4.0 licence. DOI: [10.5281/zenodo.3332807](https://doi.org/10.5281/zenodo.3332807)

Refresher... A is for Accessible...

Access

the object and
the metadata of the object

Retrieve (not resolve) by PID

- *metadata always*
- *object, maybe not*

Protocols open, free,
implementable standardised

- *programmatic (not Click)*
- *standard APIs, web HTTPs*

Restrictions

- *authentication, authorization*
- *object might be shielded,
metadata might be, might not*

1. Access using Metadata: Gatekeeping



Open Digital Rights Language ODRL Information Model 2.2

W3C Recommendation 15 February 2018



FAIR Digital
Object

Metadata describing the user and the object

Metadata for tracking and monitoring provenance and access auditing

Disclosure control

<https://eosc-entrust.eu/>

2. Access to Metadata: FAIR Signposting



FAIR assessment can only happen if you can access the metadata to do the assessment

Look up an object's metadata using Web protocols

FAIR-
IMPACT
Support
Open Call

The
Dataverse
Project

WorkflowHub



HAL

INVENIO

DSPACE

ckan



PANGAEA.

Data Publisher for Earth & Environmental Science

COAR Confederation of Open Access Repositories

dri
Digital Repository of Ireland
Teachair Digital na hÉireann

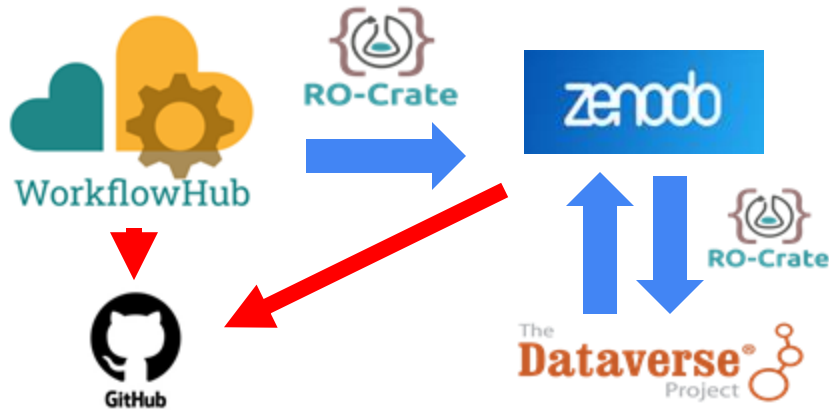
<https://signposting.org/FAIR/>

<https://doi.org/10.5281/zenodo.10490289>

2. Access to Metadata: by services, forever!

Using (Webby) FAIR Digital Objects to move metadata **pointing to objects** between services

The registry disappears, can rescue and access the metadata, if not the object itself!



FAIR-IMPACT Support Open Call

3. Accessing Semantic Artefacts

Agronomy Ontology (AGRO) OWL [View license](#)

Last submission date November 2, 2022

Summary [Classes](#) [Properties](#) [Instances](#) [Notes](#) [Mappings](#) [Widgets](#) [Sparql](#)

Description

AgrO is an ontology for re

Initial created on November
(c.aubert@cgiar.org).

Languages



Keywords and classes

agricultural experiment

<http://purl.obolibrary.org>

Categories and subjects

Ag Eng Ag Res Na

Metadata Schema
standardize descriptions

Mapping to	Ontology
chemical role >	FLOPO
chemical role >	PCSM
chemical role >	ECTO
chemical role >	ENVO

Mappings

FAIRsharing.org: 812 terminologies, 950 schemas

Concepts
define what we

Schema Crosswalks and Concept Mappings

can be simple, complex, computed

The CodeMeta Project

Software Metadata



 Crosswalk for WikiData Properties

 Crosswalk for DataCite metadata

 Crosswalk for Debian packages

 Crosswalk for DOAP Ontology

 Crosswalk for GitHub API

 Crosswalk for Java's Maven metadata

 Crosswalk for NodeJS package.json

 Crosswalk for Python distutils

 Crosswalk for R Packages

 Crosswalk for Ruby gems

<https://codemeta.github.io/crosswalk/>



codeRepository

html_url

programmingLanguage

languages_url

downloadUrl

archive_url

author

login

dateCreated

created_at

dateModified

updated_at

keywords

topics

license

license

description

description

identifier

id

name

full_name

issueTracker

issues_url



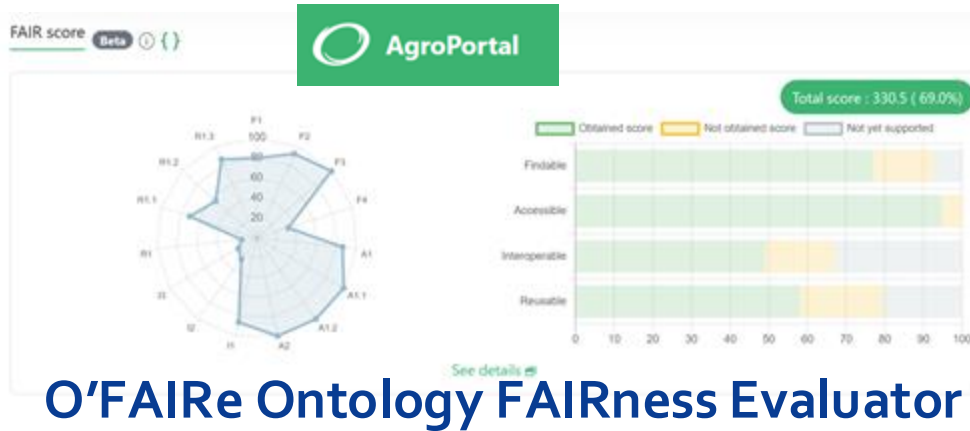


An EOSC FAIR Federation

is an exercise adaptable
metadata
crosswalks and mappings



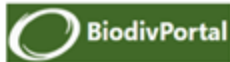
Semantic Artefacts are also FAIR (including Access)



Metadata retrievable always and forever (even if the object is not)

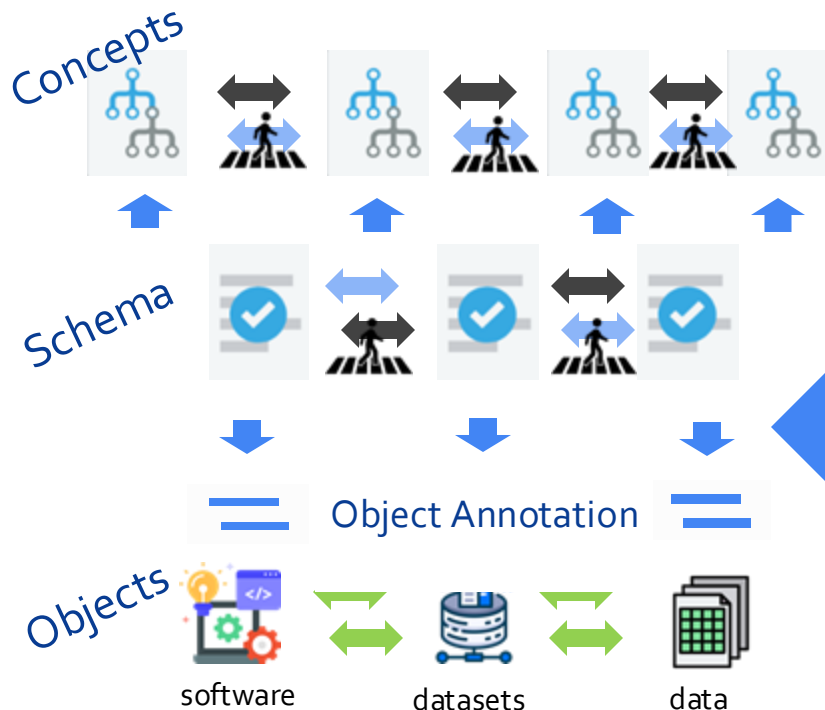
The Semantic Artefacts and their versions used in the metadata be forever retrievable?

EOSC interoperability Framework
Recommendations, 2021, doi: 10.2777/620649



12. (Meta)data use vocabularies that follow FAIR principles

Accessing the Dynamic Semantic Artefact Web



versioning & dependencies like
FAIR Software: Access by PIDs

- Different **versions** (forever)
- **Levels of granularity**

Curation servants

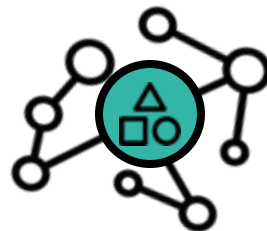
External
infrastructure, governance, methodologies

Accessing Semantic Artefacts: Capability & Capacity

Infrastructure, mapping methodology, governance, services



Semantic Artefact Catalogues
Mapping Entity Repositories
API Access
Catalogue/Repo Federation



Semantic Artefacts for
the Semantic Artefacts
API Definition



EOSC Metadata
Schema and Crosswalk
Registry

The Metadata for
Ontology Description
MOD and MOD-API



EOSC Data Type
Registry



Profile Registries

Developing and implementing the semantic interoperability recommendations of the EOSC Interoperability Framework 2024, <https://doi.org/10.5281/zenodo.10843882>

Accessible to the Developers of EOSC Infrastructure

Semantic Artefacts need those access protocols to enable smart services

Widely known developer friendly toolbox of reliable high-quality services.

Capability and capacity to use.

Reliability and robustness of services.

Otherwise?

Elastic Search, LLMs, roll my own schema.

HTTP protocol + HTML content = development of web browsers



Strategic Research and Innovation Agenda of the EOSC, Nov 2024, Priority for metadata

FAIR for AI

Semantic Artefacts for AI

Embedding in Knowledge Graphs/LLMs

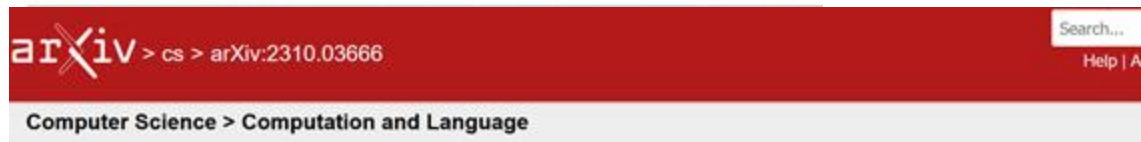
AI for FAIR metadata auto-assistance

- Sensitive data disclosure control
- Metadata annotation & curation
- Semantic Artefacts themselves



Deciphering the data deluge: how large language models are transforming scientific data curation

Large language models are changing the way we carry out scientific data curation, annotation, and research, setting the stage for a more efficient understanding of scientific literature



[Submitted on 5 Oct 2023]

MapperGPT: Large Language Models for Linking and Mapping Entities

Nicolas Matentzoglou, J. Harry Caufield, Harshad B. Hegde, Justin T. Reese, Sierra Moxon, Hyeongsik Kim, Nomi L. Harris, Melissa A Haendel, Christopher J. Mungall

Accountability, Quality control, Transparency....

The Impact of Generative AI on Critical Thinking: Self-Reported Reductions in Cognitive Effort and Confidence Effects From a Survey of Knowledge Workers

Hao-Ping (Hank) Lee

Advait Sarkar

Lev Tankelevitch

GenAI shifts the nature of critical thinking toward information verification, response integration, and task stewardship.

niwilson@microsoft.com

Will LLMs and Elastic Search replace or complement Semantic Artefacts and metadata?

Access for All: Equitability

Controlled Access, Inclusive Access, Participation

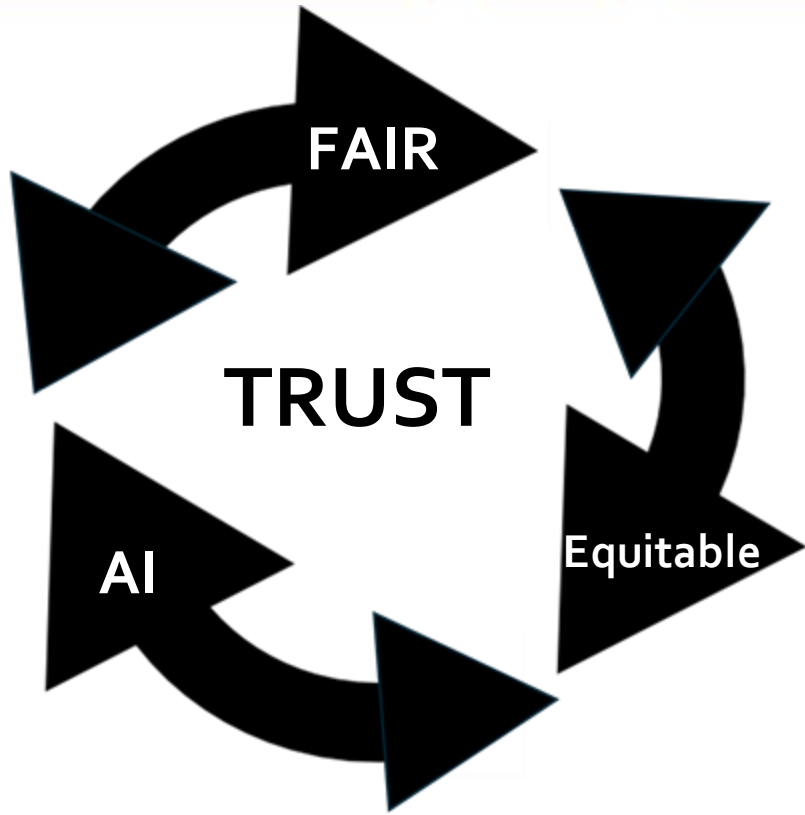


Equitable participation in knowledge development, schema specification and metadata curation

Equitable access to Semantic Artefact infrastructure and services

Equitable access to **infrastructure training and specialists**

<https://www.gida-global.org/care>



Access is not just protocols. Semantics Matter!

Requires infrastructure and capacity
+ Equitable access for developers
(and everyone else)

AI is game changing

With thanks!



Morane Gruenpeter



Mark Wilkinson



Nick Juty



Clement Jonquet



Tony Burdett



Meznah Aloqalaa



Fotis Psomopoulos

Developing and implementing the semantic interoperability recommendations of the EOOSC Interoperability Framework

(subvolume of EOOSC 4 'The Semantic Interoperability' (2017-2022))

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2. Member, EOOSC Task Force on Semantic Interoperability

All authors have endorsed the manuscript.

This work is based on the intellectual and all members of the task force and community when the manuscript is being developed.

Peer-reviewing 10.5281/zenodo.1688883

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Research Software MetaData (RSMD) guidelines, the CodeMeta standard and the RSAC services

Morane Gruenpeter, Software Heritage

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CodeMeta: Semantic artefacts for Research Software

Morane Gruenpeter (Inria)

FAIRCORE4EOSC WP6 lead

FAIR-IMPACT T4.3 lead



Software is a Pillar of Open Science

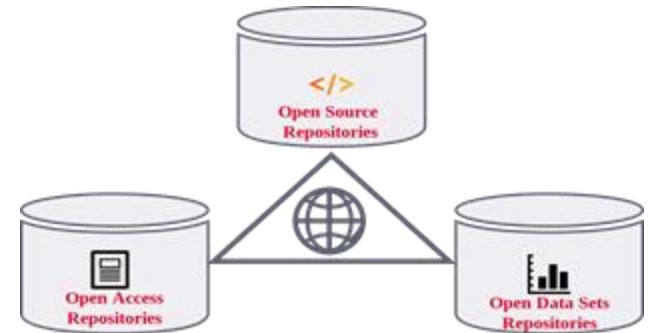
Research Software

- created
 - during the research process
 - for a research purpose

Software in research

→ used for research

FAIR4RS output: Gruenpeter et al. Defining Research Software: a controversial discussion (Version 1). Zenodo. <https://doi.org/10.5281/zenodo.5504016>

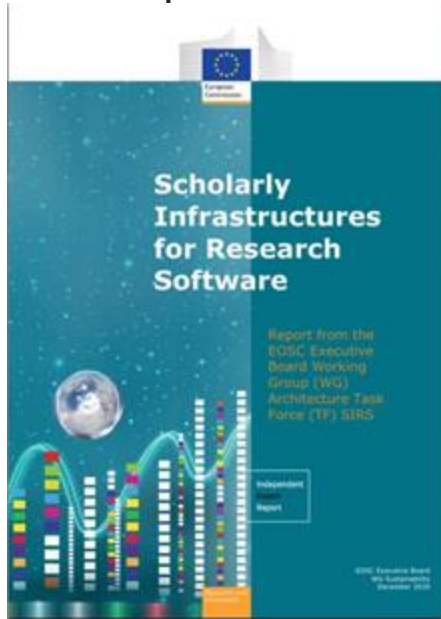


*Three pillars of Open Science
Software Heritage CC-BY 4.0 2019*

Software has multiple facets:

- a **tool**
- a research **outcome** or result
- **the object** of research

Implementing an EOSC vision to software metadata



- Creating the Research Software MetaData guidelines
 - [RSMD guidelines](#)
- Contributing to the [CodeMeta](#) initiative
 - ◆ Implementing a community **governance model**
 - The establishment of a Project Management Committee
 - ◆ Refactoring CodeMeta vocabulary, tools and mappings



SIRS report: European Commission, Directorate-General for Research and Innovation, *Scholarly infrastructures for research software : report from the EOSC Executive Board Working Group (WG) Architecture Task Force (TF) SIRS*, Publications Office, 2020, <https://data.europa.eu/doi/10.2777/28598>



How to describe software? We need metadata...

Software development platforms

(on platform page)

- GitHub
- Bitbucket
- SourceForge
- ...

Package managers

- PyPI
- NPM
- ...

Catalogs and registries

- ASCL
- swMath
- OpenAire
- libraries.io
- Research Software Directory - escience center
- ...

Scholarly repositories

- Zenodo (InvenioRDM)
- HAL
- ...

In the source code (as a file)

- README
- LICENSE
- AUTHORS
- Package manager file
- codemeta.json / CFF file
- ...

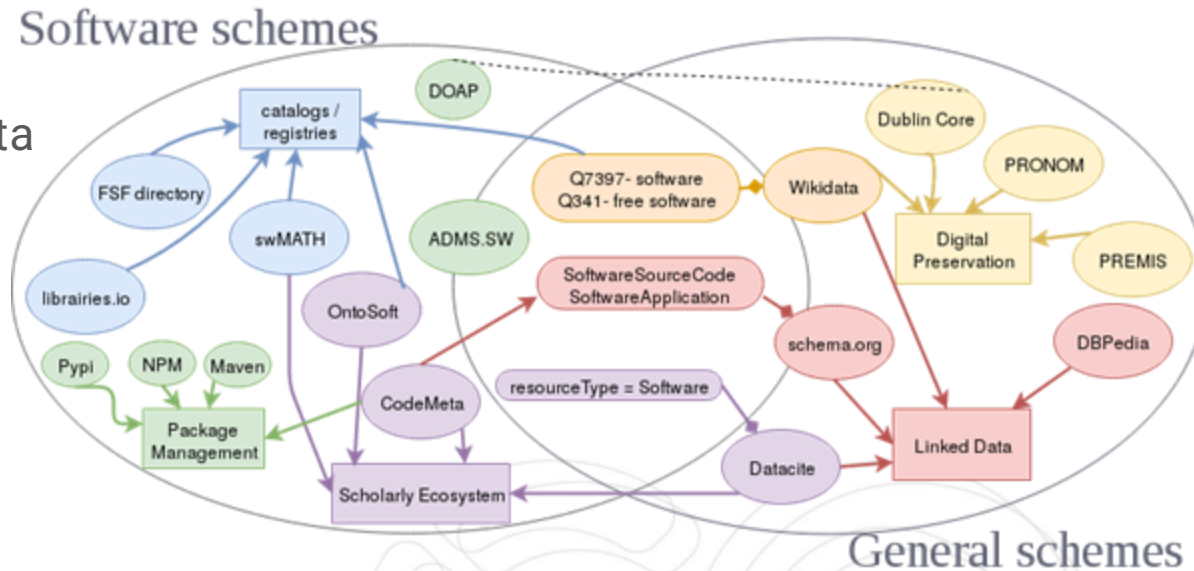
Intrinsic metadata

Scholarly publishers

- IPOL
- eLife
- Dagstuhl
- Episciences
- ...

CodeMeta Initiative

- A subset of schema.org
- An academic community discussing software metadata
- A crosswalk table - mapping the metadata landscape



Gruenpeter M. and Thornton K. (2018) Pathways for Discovery of Free Software (slide deck from LibrePlanet 2018).
<https://en.wikipedia.org/wiki/File:Pathways-discovery-free.pdf> accessed on 6.11.2020.

3.0 Latest

 progval released this Jul 13 · 1 commit to master since this release  3.0  19a4de2

Vocabulary changes:

- Renamed `codemeta:contIntegration` to `codemeta:continuousIntegration` (#302 by @tmorrell)
- Renamed `codemeta:embargoDate` to `codemeta:embargoEndDate` (#314 by @tmorrell)
- Added `codemeta:hasSourceCode` and `codemeta:isSourceCodeOf` to describe links between `schema:SoftwareSourceCode` and `schema:SoftwareApplication`. (#300 by @dgarijo and @progval)

Context changes:

- Updated the context with the above names changes.
- Removed type restriction to `schema:releaseNote` (#280 by @progval)
- Added `schema:Role`, `schema:startDate`, `schema:endDate`, and `schema:roleName`, to allow easier expression of author and contributor roles. See <http://blog.schema.org/2014/06/introducing-role.html> for an introduction to the concept. (#241 by @progval)
- Added `schema:Review`, `schema:review`, `schema:reviewAspect`, and `schema:reviewBody`, to describe software reviews. (#311 by @progval)

Other changes:

- Added a crosswalk from `codemeta v2` to `codemeta v3` (#315 by @progval)
- Fixed some new crosswalks missing from `crosswalk.csv` (#316 and #317 by @progval)

We have a version 3.0 

Compare 

Matthew B. Jones, Carl Boettiger, Abby Cabunoc Mayes, Arfon Smith, Morane Gruenpeter, Valentin Lorentz, Thomas Morrell, Daniel Garijo, Peter Slaughter, Kyle Niemeyer, Yolanda Gil, Martin Fenner, Krzysztof Nowak, Mark Hahnel, Luke Coy, Alice Allen, Mercè Crosas, Ashley Sands, Neil Chue Hong, Patricia Cruse, Daniel S. Katz, Carole Goble, Bryce Mecum, ., 2023. CodeMeta: an exchange schema for software metadata. Version 3.0.

The CodeMeta generator

- An open source tool to create codemeta.json files
 - Use it directly on the CodeMeta [hosted version](#)
 - Contributions are welcome on the [code repository](#)

Contributed to the community by



Most fields are optional. Mandatory fields will be highlighted when generating Codemeta.

The software itself

Name

the software title

Description

Creation date

First release date

Updating tool with the v3.0:

<https://github.com/codemeta/codemeta-generator/issues/23>

CodeMeta v3.0 identification: pathway to accessibility

Ideally we should:

1. Get the context file directly, when requesting JSON-LD
2. Get the documentation page for the terms, when requesting HTML
3. Have individual term identifiers resolve to anchored term definitions when HTML is requested.

The accepted suggestion is using <https://w3id.org/codemeta> (Thanks @dgarijo !)

- `curl -sH "Accept:application/ld+json" -L https://w3id.org/codemeta/ will get you the JSON.`
- If you resolve <https://w3id.org/codemeta/> in your browser, it should take you to the v3.0 of <https://codemeta.github.io/terms/>
- Version ids are supported: <https://w3id.org/codemeta/{version}>.
- For example <https://w3id.org/codemeta/1.0>. I redirected the HTML of the versions to <https://codemeta.github.io/terms/>
 - a. Version should be supported in the html too
- W3ID is open: <https://github.com/perma-id/w3id.org/tree/master/codemeta>

How To crosswalk? CodeMeta mappings

First, know your target vocabulary = CodeMeta

The screenshot shows the GitHub interface for the 'codemeta/codemeta' repository. The search bar at the top contains the query 'is:open label:crosswalk'. Below the search bar, there are filters for 'Labels: 15' and 'Milestones: 4', along with a 'New issue' button. The main content area displays a list of issues with the following details:

Issue Title	Labels	Comments
DOAP revision	crosswalk	2
Composer crosswalk	crosswalk, discussion	12
Add a first version of codemeta - conda crosswalk	crosswalk	3
Let crosswalk authors supply information specific to their crosswalk?	crosswalk, enhancement	2
Add display of CodeMeta document to MetacatUI	crosswalk	0

The Research Software MetaData guidelines

The RSMD seven Aspects



<https://github.com/FAIR-IMPACT/RSMD-guidelines>

1. General Metadata Requirements

2. Accessibility & preservation

3. Reference & identification

4. Description & classification

5. Attribution & credit

6. Reuse, licensing & legal aspects

7. Re-execute: Dependencies & execution environment

SIRS report

FAIR4RS

A = Archive

A = Accessible

R =
Reference

F = Findable

D = Describe

I = Interoperable

C = Cite

R = Reusable

RSAC=> Interoperability driven approach through MD

Research Software APIs and Connectors: implementing

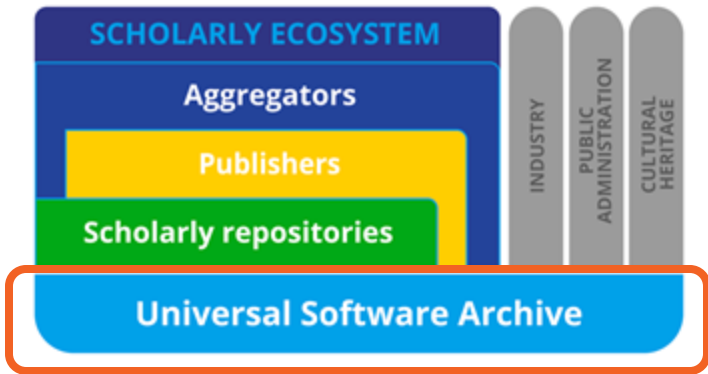
- The [RSAC components](#) connecting Software Heritage with
 - **Scholarly repositories:** Zenodo (CERN), DANS Dataverse's instance,
 - **Publishers:** Dagstuhl, Episciences
 - **Aggregators:** SwMath, OpenAire & Datacite



SCHLOSS DAGSTUHL
Liberales Zentrum für Informatik



an information service for mathematical software



10.5281/zenodo.14509418



Read metadata
curation report or
come to the RS
stand



Software Heritage

Join the effort to describe software!

Thank you for your engagement.



 | FAIR-IMPACT
Expanding FAIR solutions across EOSC

 | FAIRCORE4EOSC
Core Components Supporting a FAIR EOSC

FAIR mappings recommendations and the MSCR service

Yann Le Franc, e-Science Factory & Joonas Kesäniemi,
CSC

FAIRfest 20 February 2025
The Hague, The Netherlands (Madurodam)
Celebrating the advancements in FAIR solutions for EOSC

What do we mean by mappings?

*“A **mapping** defines connections or relationships between different information elements by identifying similarities, correspondences, and alignments. Mappings include different types of connections, depending on the level of the elements that are being mapped.”*

*“A **crosswalk** is a set of mappings connecting two information objects together”*

Moving towards FAIR mappings and crosswalks. Jana Martínková, Nick Juty, Alejandra Gonzalez Beltran, Carole Goble and Yann Le Franc
CEUR Workshop Proceeding - Vol-3882



Why making mappings FAIR?

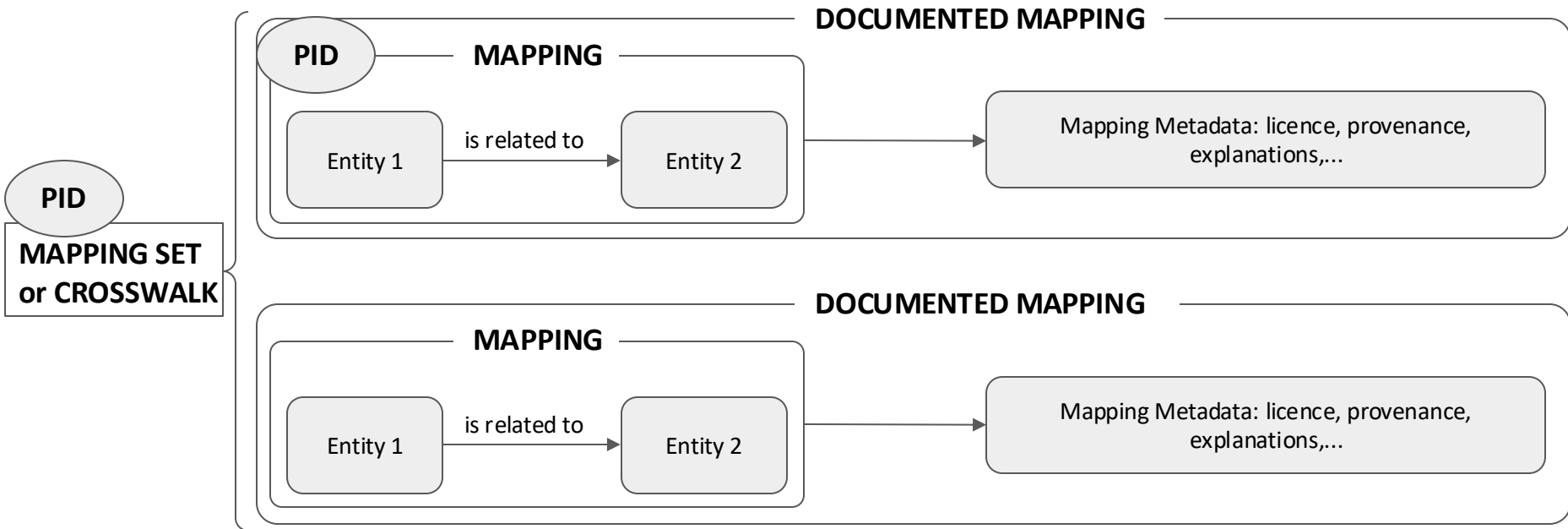


FAIR
Principles



What do we mean by FAIR mappings and crosswalks?

MAPPING REPOSITORY



The two sides of the FAIR Mappings in FAIR-IMPACT

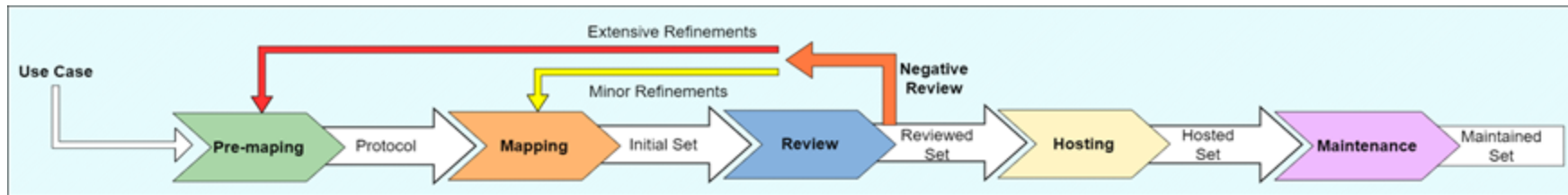
- Analysis of the requirements and technical recommendations for making mappings FAIR
- Practical aspects of mappings from creation to maintenance: understanding and documenting community practices

Open survey to collect information on mapping practices

[Contribute to the survey here](#)



Practical Mapping Framework



Use Case Owner	X		X			X
Semantic Domain Knowledge	X	X	X			
Developer/Architect	X	X			X	
Governance (Project Manager)	X				X	X

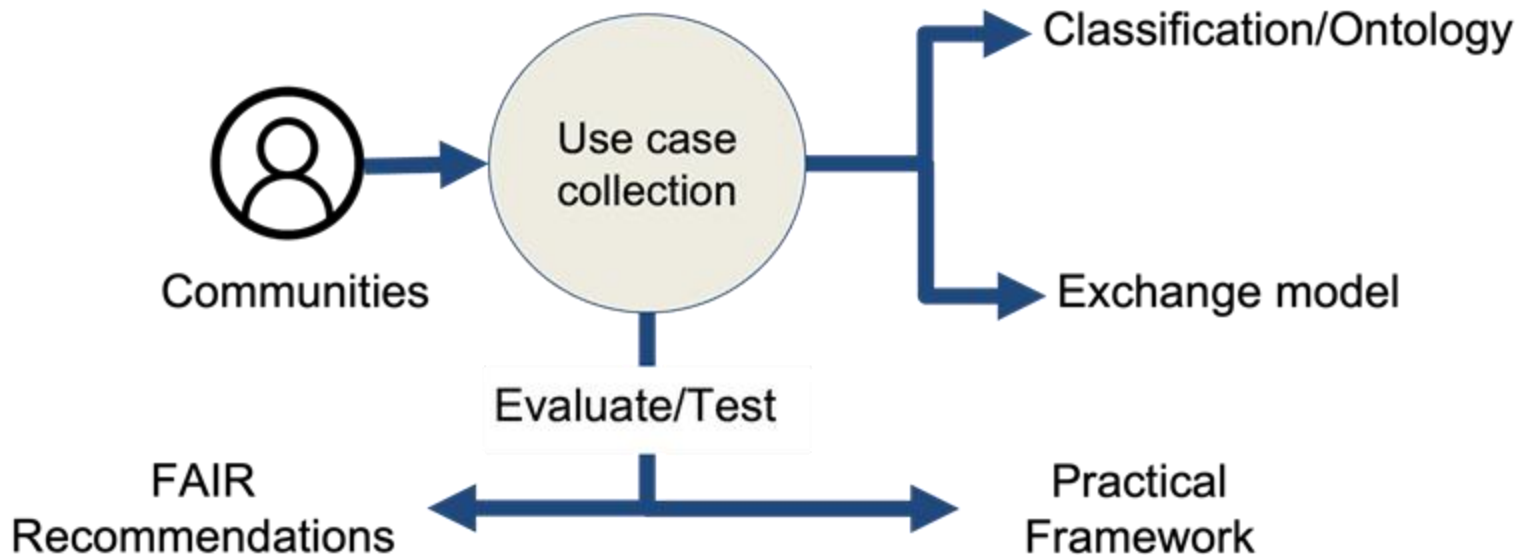
Juty, N., Le Franc, Y., Goble, C., & Martínková, J. (2024). FAIR-IMPACT Task 4.4 Workshop: Developing a Mapping Process Framework (1.0). Zenodo. <https://doi.org/10.5281/zenodo.12521432>

FAIR Mapping recommendations

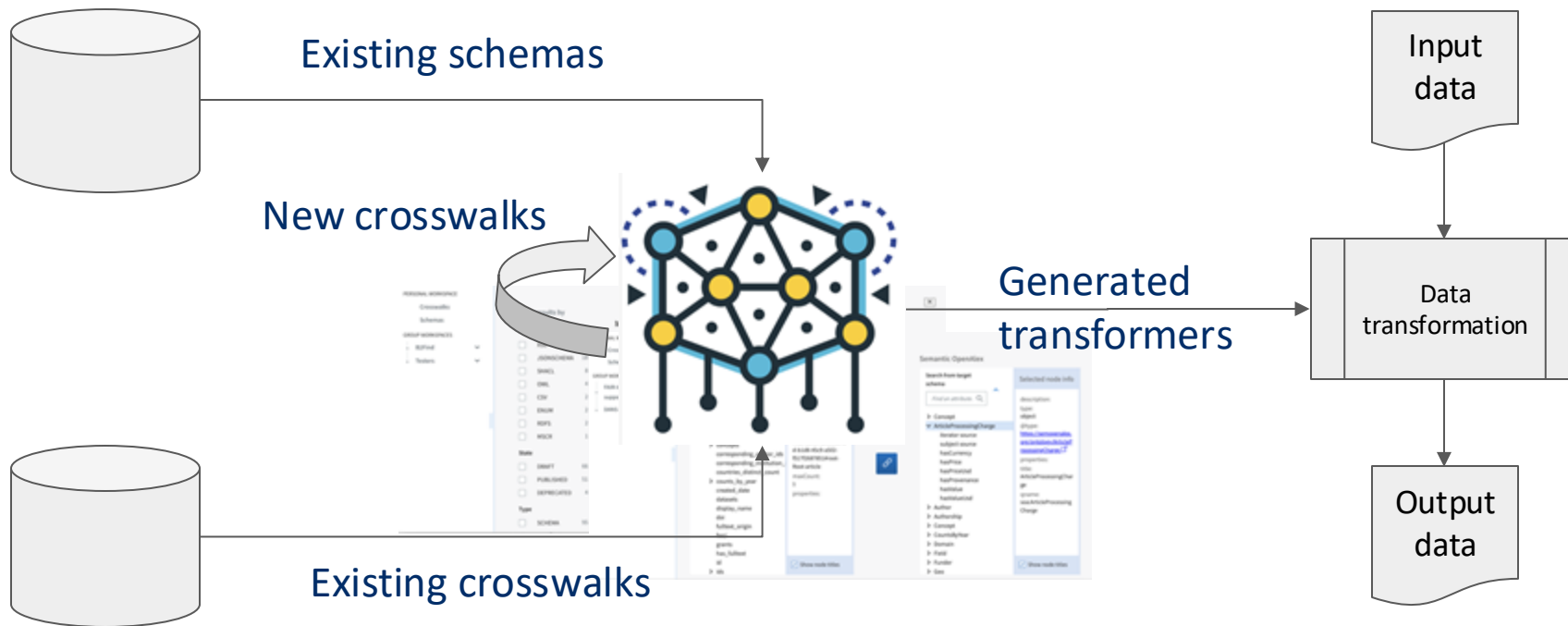
- Grouped the 15 individual FAIR principles into 4 categories:
 - **Model and Format:** Interoperability (I1, I2, I3) and Reusability (R1, R1.1, R1.2, R1.3)
 - **Metadata:** Findability (F2, F3) and Reusability (R1, R1.1, R1.2, R1.3)
 - **PID :** Findability (F1, F3)
 - **Service and API:** Accessibility (A1, A1.1, A1.2, A2) and Findability (F4)
- Established **14 Recommendations** covering the different categories
- FAIR Mapping recommendation document to be **released soon**

RDA FAIR Mapping WG: a path to sustainability

RDA FAIR Mapping WG: endorsed on 13/02/2025



Metadata Schema and Crosswalk Registry



Metadata Schema and Crosswalk Registry (MSCR)

- Semantic artefact repository - and more
- Goal is to implement the FAIR Mappings recommendations
- Two major development “tracks”
 - Registry/repository functionality
 - Crosswalk definition and operationalization
- Both contribute to the big A
 - Hosts metadata and content
 - Making crosswalks understandable for a wider audience (Visualization vs code/configuration)

Class A MSCR Features

- PIDs for all content
 - Crosswalk = set of mappings
- Versioning
 - Accessing a specific or latest version of the content
- Metadata and content always available
 - Published content is immutable
 - Tombstoning → Metadata remains

eosc | FAIR-IMPACT
Expanding FAIR solutions across EOSC

eosc | FAIRCORE4EOSC
Core Components Supporting a FAIR EOSC

FAIR Semantic Artefact and their Catalogues

Clement Jonquet, INRAE

FAIRfest 20 February 2025
The Hague, The Netherlands (Madurodam)

Celebrating the advancements in FAIR solutions for EOSC

FAIR Semantic Artefacts and their Catalogues

Clement Jonquet

clement.jonquet@inrae.fr

FAIRfest (FAIR-IMPACT & FAIRCORE4EOSC
final project meeting)

The Hague, February 20th 2025

A couple of definitions (not absolute, but adopted in EOSC)

Semantic artefacts: a broader term to include ontologies, terminologies, taxonomies, thesauri, vocabularies, metadata schemas and standards.

Legacy of FAIRsFAIR and adopted in the EOSC Interoperability Framework

Semantic artefact catalogues: encompass any existing ontology repositories, registries, vocabulary/terminology services and metadata schemas catalogues.

(Semantic) Crosswalks and mappings: formal links between the content of these semantic artefacts.

FAIRsFAIR D2.5 FAIR Semantics Recommendations

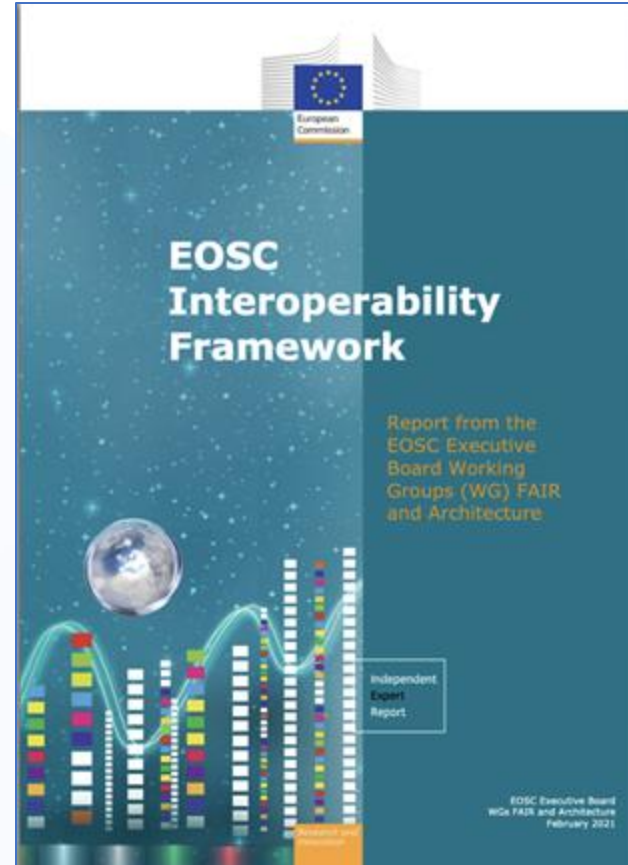
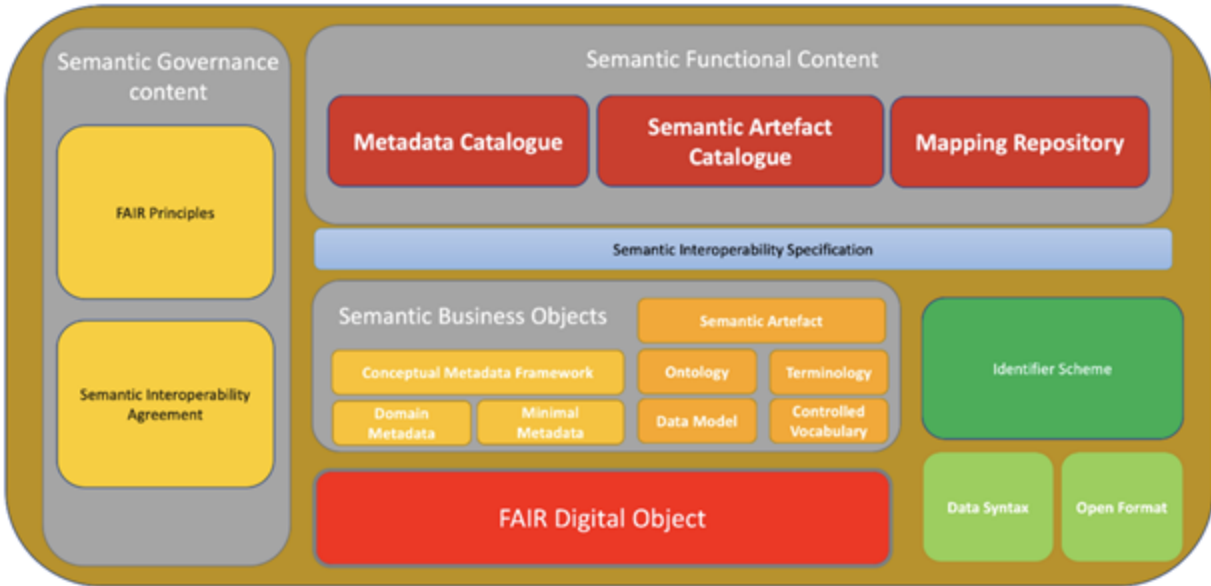


Figure 2: Semantic artefact spectrum. Derived from Leo Obrist, 2010

A semantic artefact is defined in this work as a machine-actionable and -readable formalisation of a conceptualisation, enabling sharing and reuse by humans and machines. These artefacts may have a broad range of formalisation, from loose sets of terms, taxonomies, thesauri to higher-order logics.

Moreover, semantic artefacts are serialised using a variety of digital representation formats, e.g., RDF Turtle, and OWL, using XML (RDF) and JSON-LD.

Semantic Artefact Catalogue in the EOSC Interoperability Framework



A subject studied by the EOSC task forces



The Semantic Artefact Catalogue: <i>Twelve maturity dimensions</i>	13
The Mapping Repository: <i>Making a case for FAIR mappings and crosswalks</i>	15

Milian Ojsteršek¹, University of Maribor (0000-0003-1743-8300),
 Silvio Peroni², University of Bologna (0000-0003-0530-4305),
 Andrea Schamborst³, DANS-KNAW (0000-0001-8879-8798),
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 Heinrich Widmann⁵, DKRZ (0000-0001-9871-2687)


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A maturity model for catalogues of semantic artefacts

[Oscar Corcho](#), [Fajar J. Ekaputra](#), [Ivan Heibl](#), [Clement Jonquet](#), [Andras Micsik](#), [Silvio Peroni](#)  & [Emanuele Stoeri](#)

[Scientific Data](#) **11**, Article number: 479 (2024) | [Cite this article](#)

839 Accesses | **1** Citations | **5** Altmetric | [Metrics](#)

Abstract

This work presents a *maturity model* for assessing catalogues of semantic artefacts, one of the keystones that permit semantic interoperability of systems. We defined the dimensions and related features to include in the maturity model by analysing the current literature and existing catalogues of semantic artefacts provided by experts. In addition, we assessed 26 different catalogues to demonstrate the effectiveness of the maturity model, which includes 12 different dimensions (Metadata, Openness, Quality, Availability, Statistics, PID, Governance, Community, Sustainability, Technology, Transparency, and Assessment) and 43 related features (or sub-criteria) associated with these dimensions. Such a maturity model is one of the first attempts to provide recommendations for governance and processes for preserving and maintaining semantic artefacts and helps assess/address interoperability challenges.

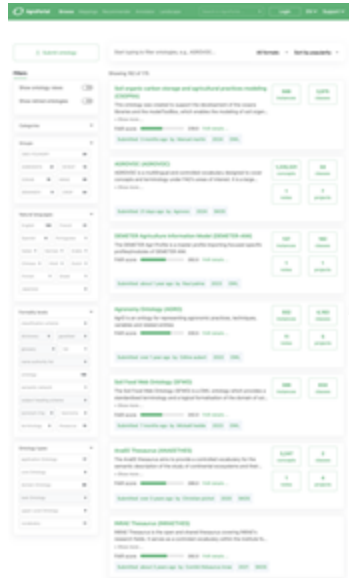
Ontology repositories help to make ontologies FAIR

Findable

Accessible 

Interoperable 

Re-usable 





Greater and more harmonised use of **semantic artefacts** throughout the EOSC ecosystem, leading to semantic interoperability **within and between disciplines.**

WP4 work on Semantic Artefact and their Catalogues

*WP4 will develop and foster the uptake of a semantic **framework** for the governance, creation, mapping, sharing, reuse, FAIRness assessment and interoperability of **semantic artefacts** for EOSC.*

Main focus of WP4

*...implementation
of FAIR-enabling
practices across
communities and
research outputs*



WP4's use cases include

- Agri-food (INRAE with AgroPortal, EMPHASIS, ANAEE)
- Ecology/biodiversity (LifeWatch with EcoPortal)
- Earth sciences (CNRS with DataTerra EarthPortal)
- Photons and neutrons (UKRI-STFC)
- Social sciences and humanities (DANS)
- Astronomy (Obs. Paris)

*...projecting
the FAIR
principles to
other types of
research
objects*

WP4's research
objects



**Semantic
Artefact**



**Mapping
& Crosswalk**



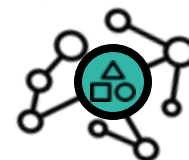
**Research
Software**

Our work on Semantic Artefacts and their Catalogues

- Existing catalogues being consolidated in communities
- New catalogues being deployed in other communities/projects
- Semantic Artefact « FAIR-by-design » methodology
- FAIReabling tools and methods being transferred
- Exhaustive review of current and retired catalogues and FAIR-enabling criteria
- Catalogues being exploited in data repositories (9 use cases)
- A metadata standard for semantic artefacts (MOD)
- A standard API for semantic artefact catalogues (MOD-API)
- Early work on federation of 4 catalogues
- 3 possible models for semantic artefact governance
- Toward specifications for FAIR mappings



Semantic Artefact
Catalogues



Semantic Artefact



Mappings

Existing catalogues being consolidated in communities

AgroPortal
EcoPortal

The image displays two screenshots of web portals. The top screenshot is for EcoPortal, featuring a search bar for classes and semantic resource identifiers. The bottom screenshot is for AgroPortal, showing a 'Welcome to AgroPortal' message and a search bar. Below the screenshots is the INRAE logo and a statistics section for AgroPortal in figures:

Category	Count
Ontologies	175
Classes	1M
Individuals	3M
Properties	11K
Projects	60
Mappings	17M
Users	433

New catalogues being deployed in other communities/projects

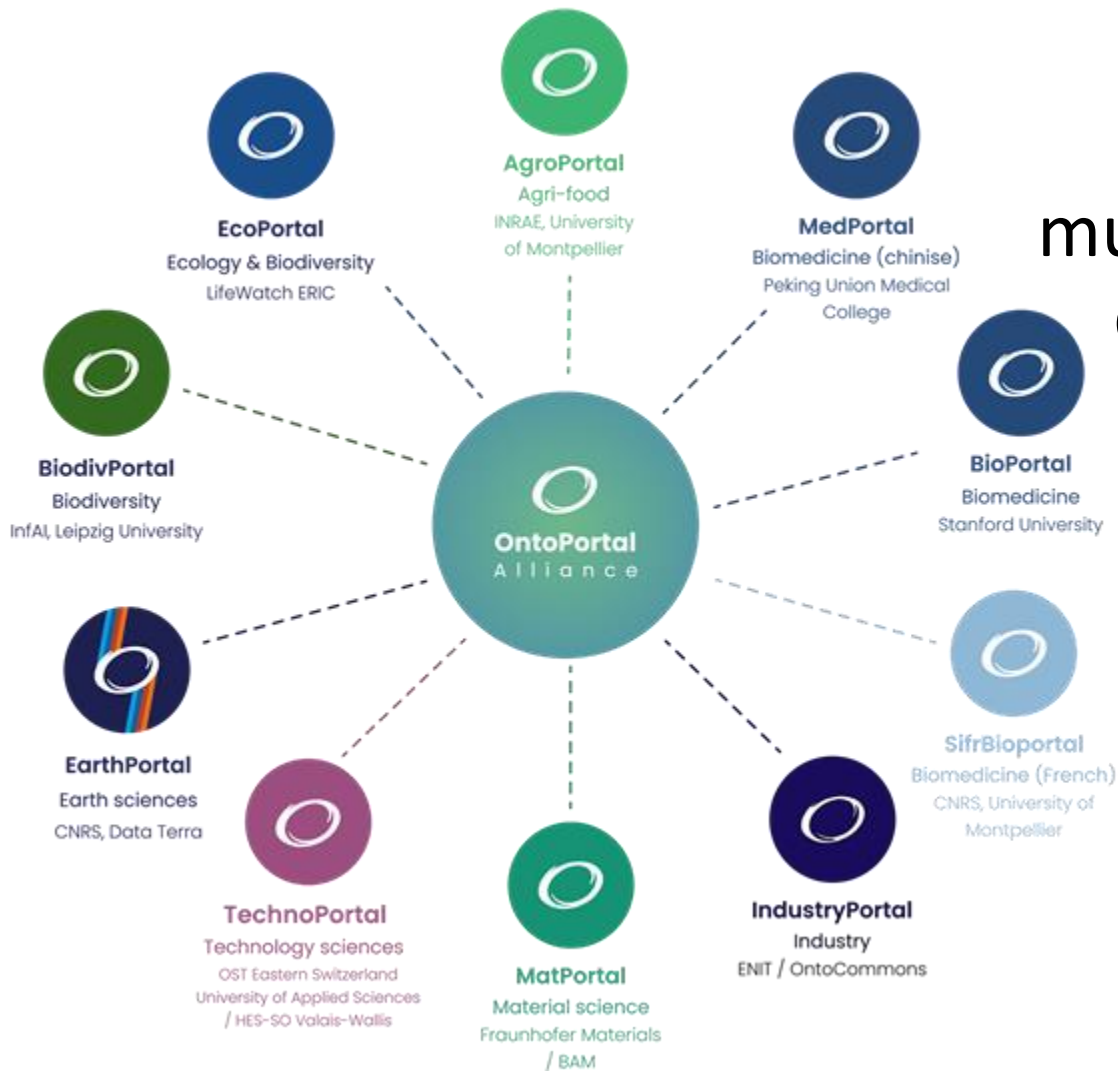
Inside of FAIR-IMPACT

- EarthPortal (earth sciences)
 - EscapePortal (astronomy)
- ...and outside (technological sciences, SSH, biodiversity)



Working with other approaches too: Linked Open Vocabularies, CESSDA Vocabularies, etc.

OntoPortal Alliance: Synchronizing and mutualizing research and development efforts

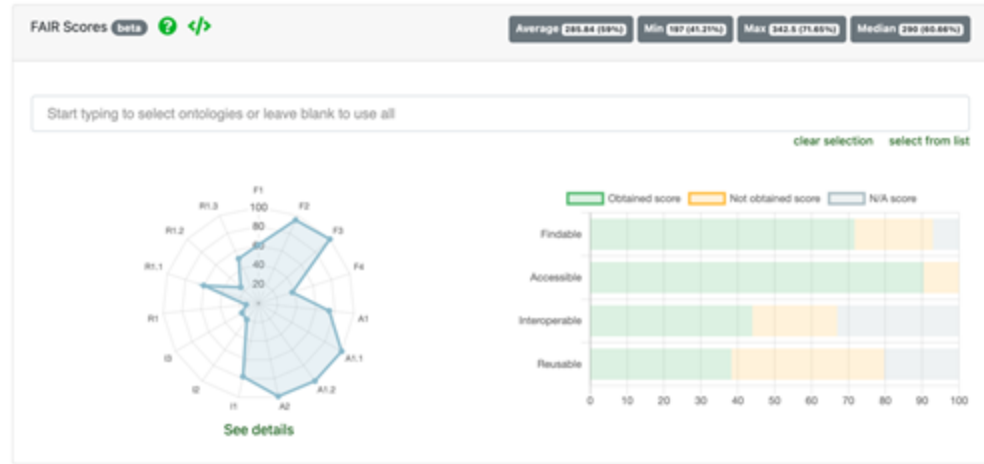


Representing OntoPortal adopters and end users

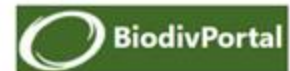
- to **maximize OntoPortal value** (state-of-the-art service portfolio)
- to improve OntoPortal **software** while managing several parallel and different installations
- to **increase semantic uptake** in science communities and facilitate adoption of the FAIR principles
- to increase the ecosystem's **long term** operational and financial health

FAIRenabling tools and methods being transferred

- 4 new deployments of O'FAIRe (the Ontology FAIRness Evaluator)
- A methodology developed and implemented first in AgroPortal



O'FAIRe
deployments:



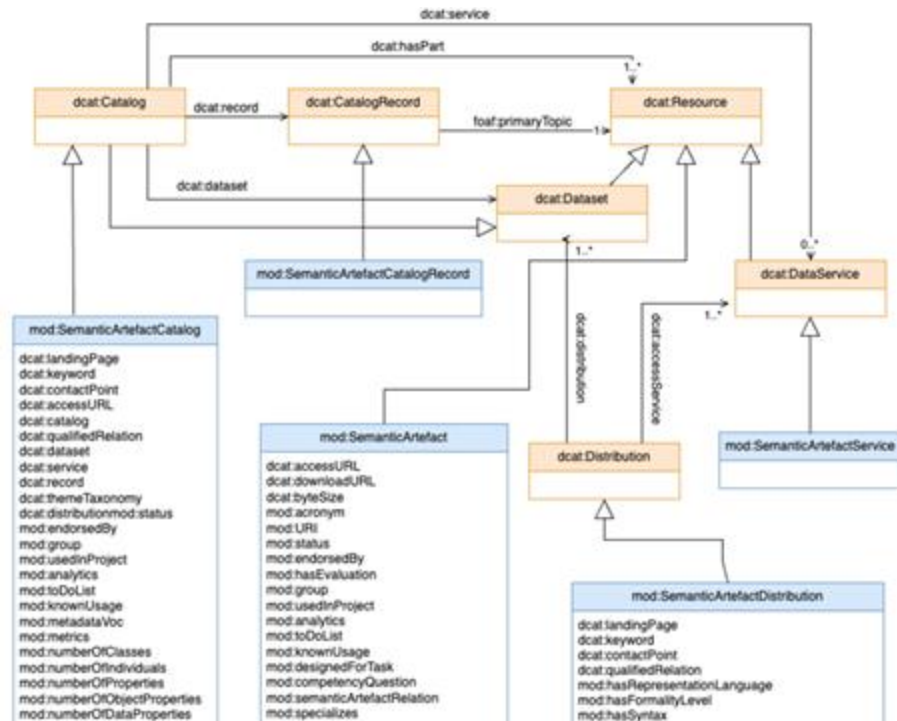
E. Amdouni, S. Bouazzouni, C. Jonquet. **O'FAIRe: Ontology FAIRness Evaluator in the AgroPortal semantic resource repository**. *ESWC 2022 - 19th Extended Semantic Web Conference, Poster and demonstration*, May 2022, Hersonissos, Greece. ([10.1007/978-3-031-11609-4_17](https://doi.org/10.1007/978-3-031-11609-4_17))

FAIRFEST - Semantic Artefact and their Catalogues - C. Jonquet -

Feb. 20, 2025

A metadata standard for semantic artefacts (MOD)

Based on DCAT



Project Title Expanding FAIR solutions across EOSC
 Project Acronym FAIR-IMPACT
 Grant Agreement No. 101057344
 Start Date of Project 2022-06-01
 Duration of Project 36 months
 Project Website <https://fair-impact.eu/>

1 M4.3 - Specification of semantic artefact description

Work Package	WP 4, Metadata and Ontologies
Lead Author (Org)	Alejandra Gonzalez-Beltran ¹ (UKRI-STFC), Antony Wilson ² (UKRI-STFC)
Contributing Author(s) (Org)	Biswanath Dutta ³ (ISI), Daniel Garijo ⁴ (UPM), Clement Jonquet ⁵ (INRAE), Yann Le Franc ⁶ (eSDF), Maria Poveda-Villalón ⁷ (UPM)
Due Date	2024-02-29
Date	2024-02-29
Version	V1.0
DOI	10.5281/zenodo.10725304



<https://github.com/FAIR-IMPACT/MOD>

A standard API for semantic artefact catalogues (MOD-API)

FAIR-IMPACT's implementation action for MOD-API (after a dedicated open call) **gathers 16 SAC providers**

GET	/artefacts	Get information about all semantic artefacts.	
GET	/artefacts/{artefactID}	Get information about a semantic artefact.	
GET	/artefacts/{artefactID}/distributions	Get information about a semantic artefact's distributions.	
GET	/artefacts/{artefactID}/distributions/{distributionID}	Get information about a semantic artefact's distribution.	
GET	/artefacts/{artefactID}/distributions/latest/resources	Get information about a semantic artefact's resources for the latest distribution.	
GET	/artefacts/{artefactID}/record	Get information about a semantic artefact catalog record.	
GET	/artefacts/{artefactID}/resources	Get a list of all the resources within an artefact.	
GET	/artefacts/{artefactID}/resources/{resourceID}	Get a specific resources from within an artefact.	
GET	/artefacts/{artefactID}/resources/classes	Get a list of all owlClasses within an artefact.	
GET	/artefacts/{artefactID}/resources/concepts	Get a list of all skos:Concept within an artefact.	
GET	/artefacts/{artefactID}/resources/properties	Get a list of all the rdf:Property within an artefact.	
GET	/artefacts/{artefactID}/resources/individuals	Get a list of all the instances (owl:Individual) within an artefact.	
GET	/artefacts/{artefactID}/resources/schemes	Get a list of all the skos:Scheme within an artefact.	
GET	/artefacts/{artefactID}/resources/collection	Get a list of all the skos:Collection within an artefact.	
GET	/artefacts/{artefactID}/resources/labels	Get a list of all the skos:Label within an artefact.	

Project Title	Expanding FAIR solutions across EOSC
Project Acronym	FAIR-IMPACT
Grant Agreement No.	101057344
Start Date of Project	2022-06-01
Duration of Project	36 months
Project Website	www.fair-impact.eu

D4.3 - Specification of shared metadata description of semantic artefacts and their catalogues including common reference API

Work Package	WP 4, Metadata and Ontologies
Lead Author (Org)	Antony Wilson ¹ (UKRI-STFC), Clement Jonquet ² (INRAE)
Contributing Author(s) (Org)	Alejandra Gonzalez-Beltran ¹ (UKRI-STFC), Daniel Garijo ¹ (UPM)
Due Date	2027-07-31
Date	2024-07-01
Version	V1.0 - DRAFT NOT YET APPROVED BY THE EUROPEAN COMMISSION
DOI	https://doi.org/10.5281/zenodo.12579778



<https://github.com/FAIR-IMPACT/MOD-API>

OntoPortal Federation: SAC talking one-another!

- Explore ontologies across the four portals, using:
 - **federated browsing**
 - **federated search**
- But also federated:
 - APIs,
 - user interfaces,
 - documentation,
 - Categories
 - and more!

Connect to external OntoPortal

The screenshot shows the OntoPortal Federation search interface. On the left, there are filters for ontology views, categories, groups, languages, formality levels, and ontology types. A section titled 'Results from external portals' contains buttons for connecting to various external portals like AgroPortal, BioPortal, EcoPortal, EarthPortal, and BiodivPortal. The main search results area shows a list of ontologies with details such as title, description, submission date, and format. Two specific ontologies are highlighted with red dashed boxes: '3-Step Theory of suicide (THREE-ST)' and 'ABC Base Ontology (ABCD)'. Arrows from external text point to these boxes.

Redirect to original portal

Merge duplicates

Federated Search

- A new dimension to SA exploration by enabling users to search concepts and classes not only within the local SAC but also across other federated OntoPortal instances
- Results are merged and sorted
- Move to the original portal if the result is from a federated portal

Search results for 'plant height' showing various filters and external portal options.

Search language: All languages

Include in search: Property values, Obsolete classes, Ontology views

Show only: Exact matches, Classes with definitions

Results from external portals: AgroPortal, BioPortal, EcoPortal, IndustryPortal, EarthPortal, BiodivPortal, TestPortal



Search results for 'plant height' from various ontologies:

- plant height - Biodiversity Thesaurus (BIODIVTHES)
 - 14 more from this ontology
 - Click: Display class in the original portal
- Plant Material Height - The Ecosystem Ontology (EC50)
 - 17 more from this ontology
 - Reuses in 1 ontologies
- Plant height/width ratio - Groundnut Ontology (CO_337)
 - 1 more from this ontology
 - AgroPortal
- Plant height generative - Thesaurus of Plant Characteristics (TOP)
 - 2 more from this ontology
 - Reuses in 1 ontologies

Search results for 'atmospheric boundary layer height' showing a duplication in class ID and ontology acronym.

atmospheric boundary layer height - ACTRIS Vocabulary (ACTRIS_VOCAB)

- 1 more from this ontology
- EcoPortal
- EarthPortal

plant density - Population and Community Ontology (PCO)

- 2 more from this ontology
- EcoPortal

Duplication in (class id + ontology acronym)

3 approaches to SAC interoperability

FA
Expanding

MOD-API

- Each SAC implements a shared/standard API
- - - API needs to be produced and maintained
- - - need SAC to commit to implement API Open call
- ++ more robust
- ++ no proxy or indirection
- ++ more sustainable
- ++ engage SACs towards interoperability



OntoPortal

- SACs are already interoperable at API/backend level and may federate their content (at UI level)
- + + no need to implement another API
- + + federation is straightforward as APIs are the same
- - - works only for OntoPortal



API Gateway

- SACs do nothing, TS4NFDI implements the wrappers to consume SKOSMOS-based, OLS-based and OntoPortal-based SACs
- + + very convenient for SACs
- - - need a proxy in the middle
- - - less sustainable
- - - does not engage SACs on the interoperable path

Deliverables (done & *upcoming*)

- D4.1 - Semantic artefact **governance models** and disciplinary approaches for inclusion within EOSC
- M4.2 - Processes & tools to **engineer FAIR semantic artefacts**
- D4.3 - Specification of shared **metadata description** of semantic artefacts and their catalogues including common reference API
- D4.4 - Guidelines for recommended **metadata standard for research software** within EOSC
- D4.2 - FAIR **semantic artefact lifecycle** from engineering, to sharing
- *D4.5 - Guidelines and methodology to create, document and share mappings and crosswalks*
- *D4.6 - Use case driven validation of semantic artefact exploitation **within data repositories***



Say Hi! to
Semantic

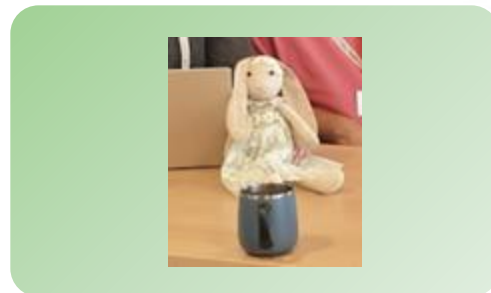


Other Milestones documents

- M4.1 - Semantic artefact governance models: example of community practices
- M5.3 - Semantic artefact FAIRness assessment methodology ready
- M4.4 - Review of semantic artefact catalogues and guidelines for serving FAIR semantic artefacts in EOSC
- *M4.5 - Internal and external use case evaluation & demonstrators*

Conclusion

- Semantic Artefact Catalogues are a **key component of the EOSC Interoperability Framework**
- In FAIR-IMPACT, we strongly relied on **OntoPortal** and made this SAC technology stronger to support FAIR SAs
- Every new community, every **new use cases brings new ideas**. Participate. Join. FAIR-IMPACT was a catalyser.
- There are even more dimensions to semantic artefacts (governance, mappings, etc.). Check out our deliverables.



WP4
Greater and more harmonised use of **semantic artefacts** throughout the EOSC ecosystem, leading to semantic interoperability **within and between disciplines.**



Summary

Questions ?

eosc | FAIR-IMPACT
Expanding FAIR solutions across EOSC

eosc | FAIRCORE4EOSC
Core Components Supporting a FAIR EOSC

DTR on the roadmap of implementing FDOs

Hans Lienhop, GDWG

FAIRfest 20 February 2025
The Hague, The Netherlands (Madurodam)

Celebrating the advancements in FAIR solutions for EOSC

Concerning Fair Digital Objects

➤ What are FAIR Digital Objects?

FAIR Digital Objects (FDO) bind all critical information about an entity in one place and create a new kind of actionable, meaningful and technology independent object that pervades every aspect of life today: **A technical essence of a “thing” in cyberspace**

“FAIR Digital Objects combine dataspace as the Internet combined computer networks”

☑ Why are they important?

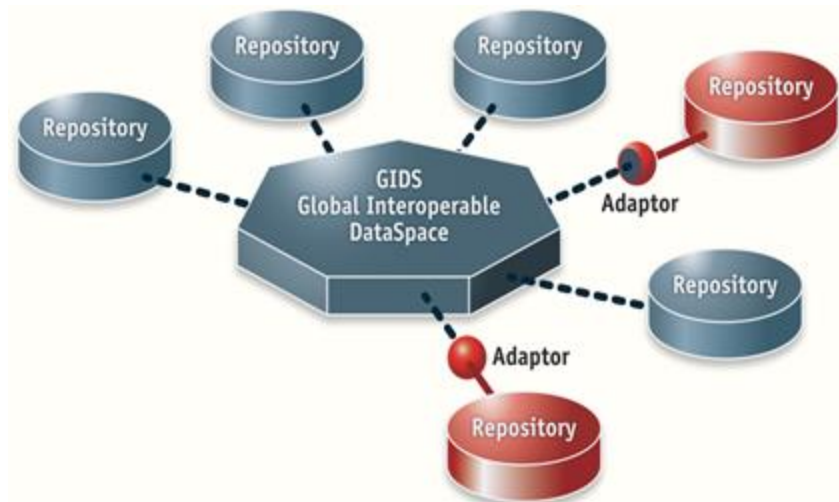
FAIR Digital Objects (FDO) provide a conceptual and implementation framework to develop **scalable cross-disciplinary capabilities**, deal with the **increasing data volumes** and their inherent complexity, build tools that help to **increase trust in data**, create mechanisms to efficiently operate in the domain of scientific assertions, and **promote data interoperability**.

“The Web was designed to enable humans to access media data, the GIDS with FDOs is designed to enable access to all data by humans and machines.”

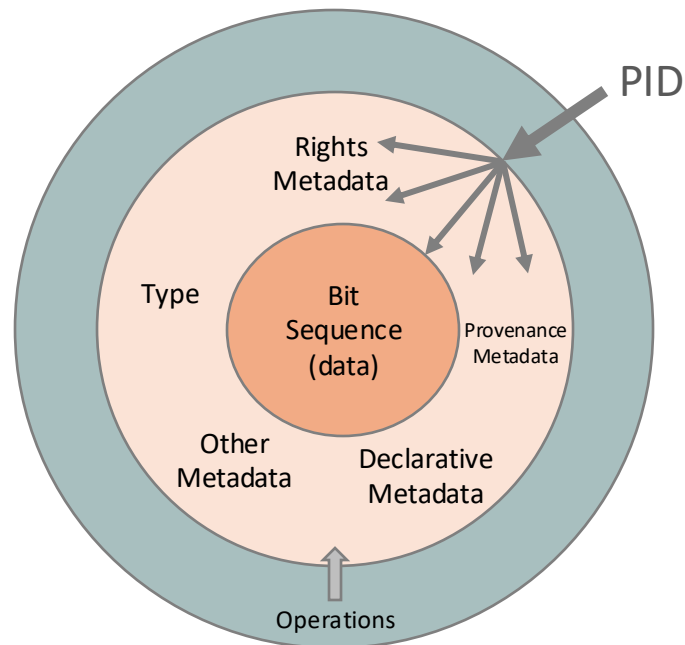
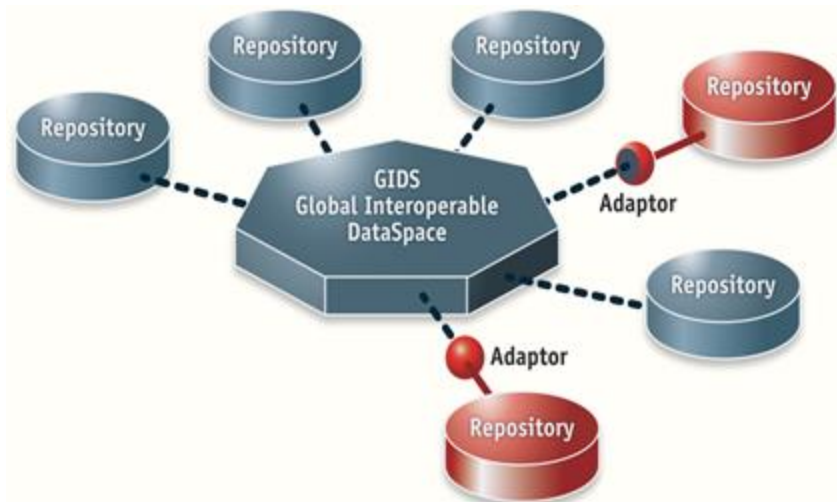
FAIR DIGITAL OBJECTS  FORUM

<https://fairdo.org/>

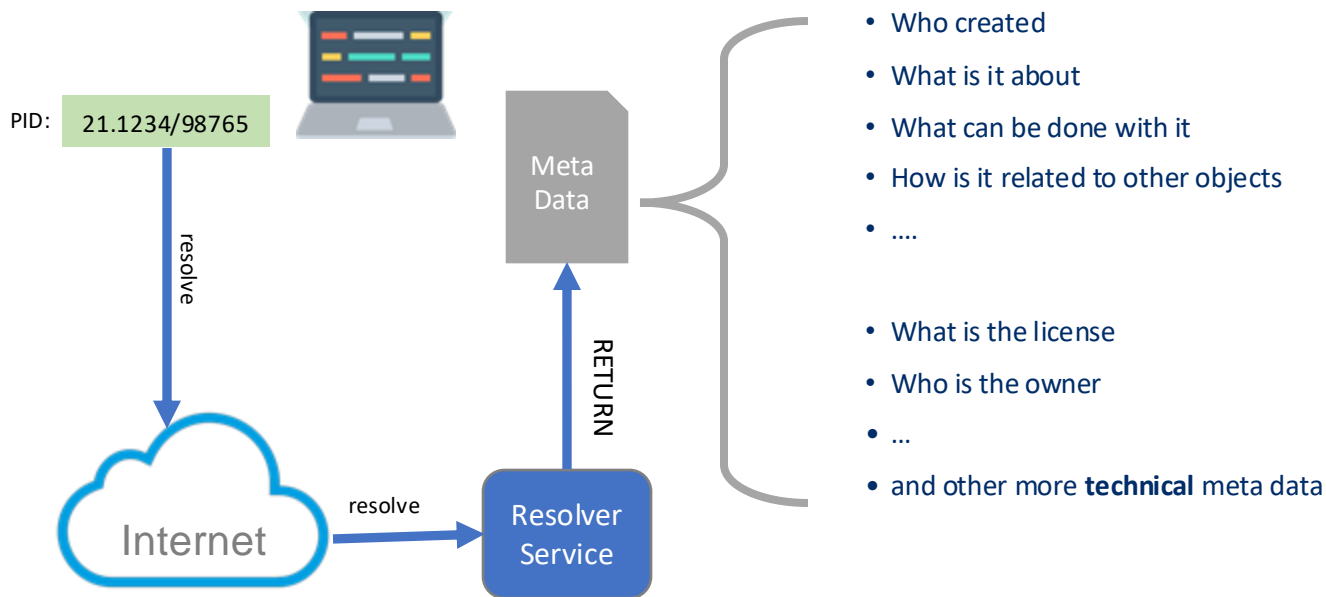
Concerning Fair Digital Objects



Concerning Fair Digital Objects

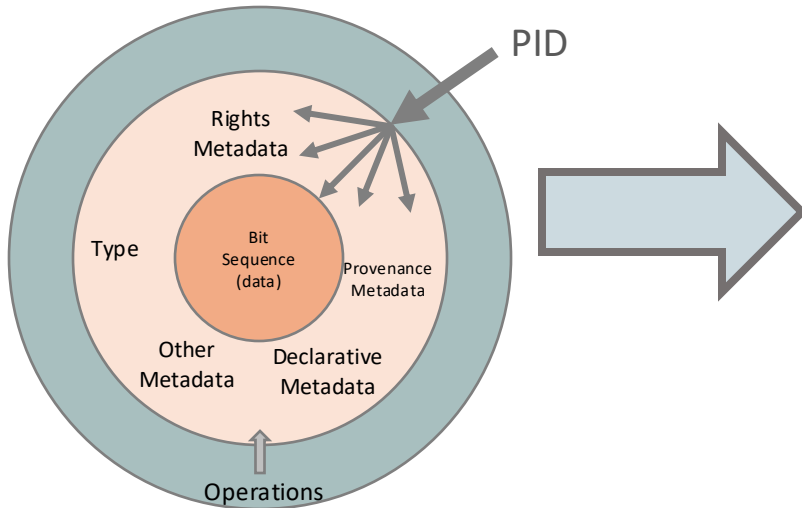


Resolving an FDO PID

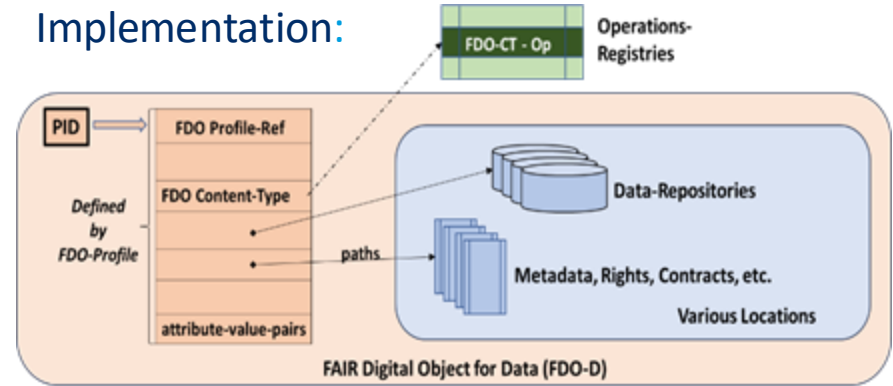


From Theory to Practice

Concept:

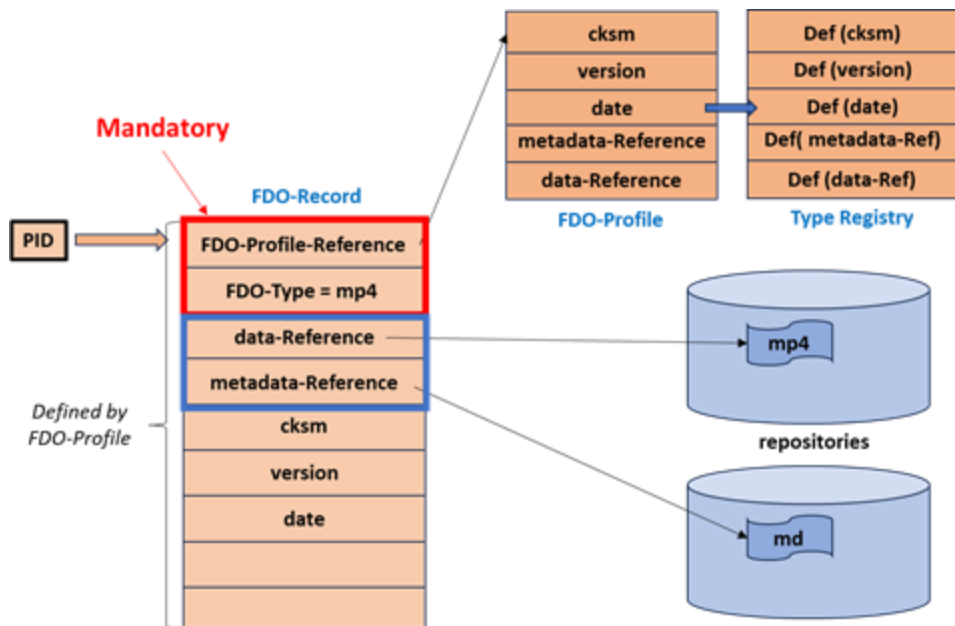


Implementation:

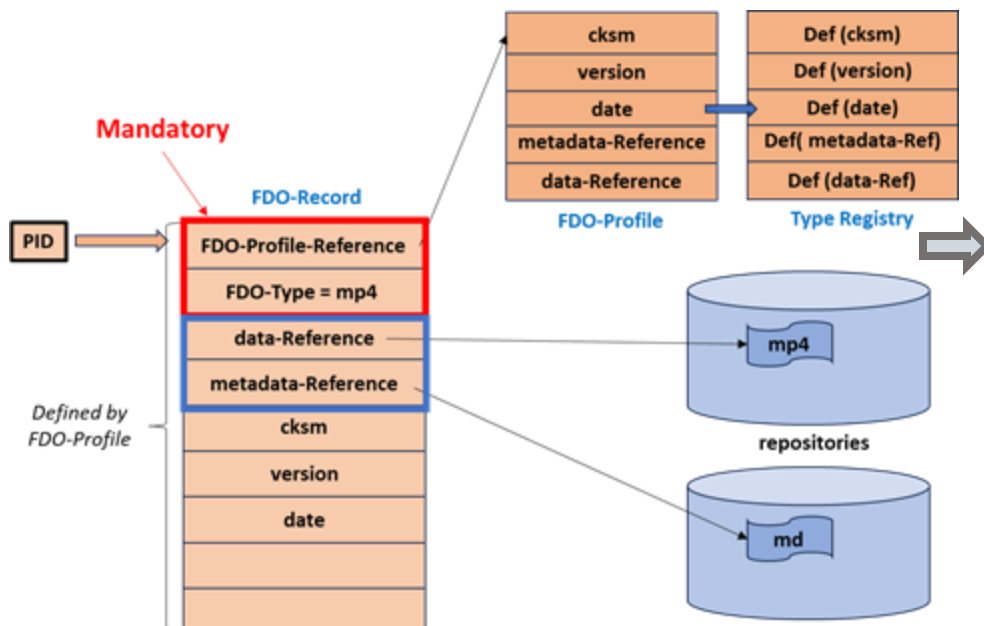


- A PID resolves to an FDO Record which is a protected set of attributes
- A Profile defines the set of attributes in the record
- Only a very minimal set of attributes is mandatory

From Theory to Practice



From Theory to Practice



Handle Values for: 21.T11967/7cac06ea60e01a96ee02

Index	Type	Timestamp	Data
100	HS_ADMIN	2024-12-01 10:44:44Z	handle=0.NA/21.T11967; index=300; [create admin,del admin,add admin,List]
1	10320/loc	2024-12-01 10:44:44Z	<locations> <location href="https://cordra.testbed.pid.1"> <location href="https://cordra.testbed.pid.1"> </locations>
2	id	2024-12-01 10:44:44Z	21.T11967/7cac06ea60e01a96ee02
3	name	2024-12-01 13:51:11Z	sensor_data_bme2080_26083_20241130
4	FDO_MD_Refs	2024-12-01 10:44:44Z	[21.T11967/5c17b5b735a90c555725]
5	FDO_Data_Refs	2024-12-01 10:44:44Z	[21.T11967/d174f6c0b2a4abda913b]
6	FDO_Profile_Ref	2024-12-01 10:44:44Z	21.T11969/141bf451b18a79d0fe66
7	FDO_Type_Ref	2024-12-01 10:44:44Z	21.1/sensordata
8	creationDate	2024-12-01 13:51:11Z	2024-12-01T10:44:44.863Z
9	modificationDate	2024-12-01 13:51:11Z	2024-12-01T13:51:11.612Z
10	createdBy	2024-12-01 13:51:11Z	admin
11	modifiedBy	2024-12-01 13:51:11Z	admin
12	FDO_Status	2024-12-01 13:51:11Z	created
13	FDO_Rights_Ref	2024-12-01 13:51:11Z	21.1/CC0
14	FDO_Genre_Ref	2024-12-01 13:51:11Z	21.1/thisIsAnFdoGenre
15	0.TYPE/DOIPService	2024-12-01 13:51:11Z	21.T11967/service

The Data Type Registry

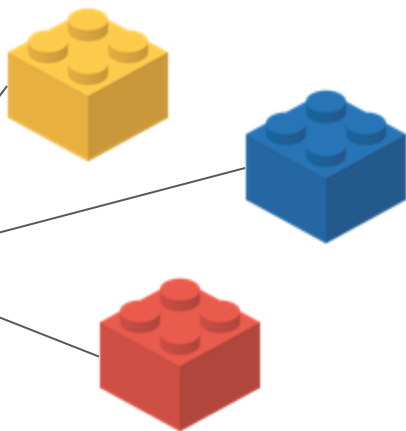


- Data Type: A grouping of Data Values based on a **set of possible values**
- Using Persistent Identifiers to ensure **Accessibility** and **Interoperability**
- Promotes the **reuse** of existing assets and the compliance with data **standards**
- Increase the **machine actionability** of Data Types and Metadata
- Validate conformity of data with data types

The Data Type Registry



Identifier
Type
Version
Provenance
...
Properties

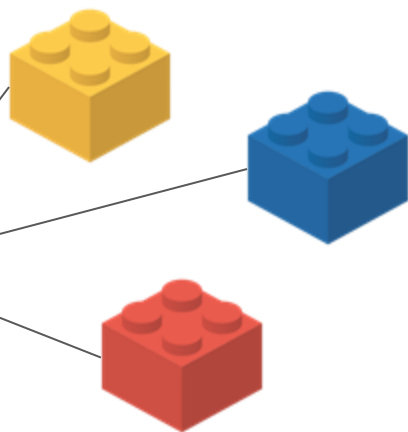


The Data Type Registry

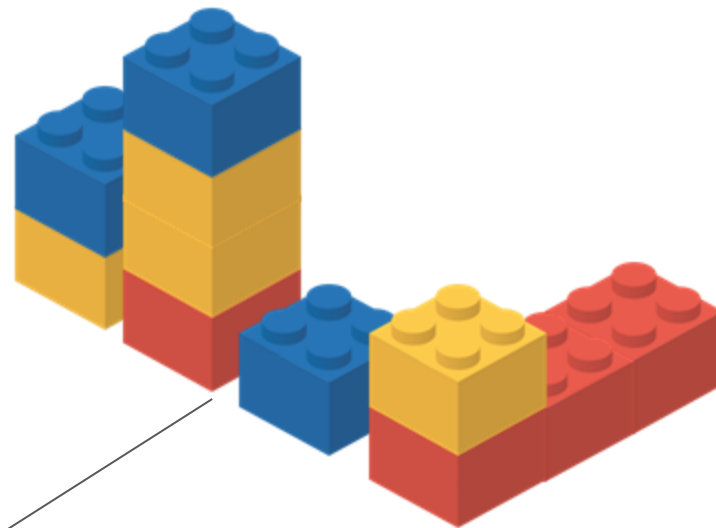


DTR
EOSC Data
Type Registry

Identifier
Type
Version
Provenance
...
Properties



Identifier
Type
Version
Provenance
...
Properties



The DTR on the FDO Roadmap

FDO_ConfigType_14

Id: 21.T11969/141bf451b18a79d0fe66

Type: Profile



OBJECT ACL VERSIONS METHODS **DO VIEW / DETAILS** RELATIVES

[View JSON](#) [JSON](#)

Identifier

21.T11969/141bf451b18a79d0fe66

Type Name *

FDO_ConfigType_14

please use printable ascii characters without blank

Description

Profile of an FDO that follows configuration type 14.

Provenance

Contributors

Name	ORCID
Jana Böhm	0009-0004-9802-113X
<small>Full name of the contributor</small>	

Creation Date

2024-02-20T10:11:53.016Z

The DTR on the FDO Roadmap

FDO_ConfigType_14

Id: 21.T11969/141bf451b18a79d0fe66

Type: Profile



OBJECT ACL VERSIONS METHODS DO VIEW / DI

Identifier

21.T11969/141bf451b18a79d0fe66

Type Name *

FDO_ConfigType_14

please use printable ascii characters without blank

Description

Profile of an FDO that follows configuration type 14.

Provenance

Contributors

Name

Jana Böhm

Full name of the contributor

Creation Date

2024-02-20T10:11:53.016Z

Type *

Object

Necessary Field to include the type in the JSON output.

Allow additional Properties

true

Allow properties in an object in addition to those mentioned in the type.

Properties

Property 1

Name *

FDO_Profile_Ref

Type *

21.T11969/bcc54a2a9ab6b2a8f0c

Type Name: FDO_Profile_Ref

Properties

Const Value

21.T11969/141bf451b18a79d0fe66

Optional field. Sets a constant value that must be present in this field for all instances of this type.

Cardinality *

1

The cardinality of the property, also describes the obligation. A cardinality of 0 - n defines an optional array, cardinality 1 - n defines a mandatory array.

Property 2

Name *

FDO_Type_Ref

Type *

21.T11969/bcc54a2a9ab6b2a8f0c

The DTR on the FDO Roadmap

FDO_ConfigType_14

Id: 21.T11969/141b451b18a79d0fe66

Type: Profile



OBJECT ACL VERSIONS METHODS DO VIEW / D

Identifier

21.T11969/141b451b18a79d0fe66

Type Name *

FDO_ConfigType_14

please use printable ascii characters without blank

Description

Profile of an FDO that follows configuration type 14.

Provenance

Contributors

Name

Jana Böhm

Full name of the contributor

Creation Date

2024-02-20T10:11:53.016Z

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Necessary Field to include the type in the JSON output.

Allow additional Properties

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Allow properties in an object in addition to those mentioned in the

Properties

Property 1

Name *

FDO_Profile_Ref

Type *

21.T11969/bcc54a2a9ab5b2a8f2c

Type Name: FDO_Profile_Ref

Properties

Const Value

21.T11969/141b451b18a79d0fe66

Optional field. Sets a constant value that must be present in this field for all instances of this type.

Cardinality *

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The cardinality of the property, also describes the obligation. A cardinality of 0 - n defines an optional array, cardinality 1 - n defines a mandatory array.

Property 2

Name *

FDO_Type_Ref

Type *

21.T11969/bcc54a2a9ab5b2a8f2c

FDO_Profile_Ref

Id: 21.T11969/bcc54a2a9ab5b2a8f2c

Type: BasicInfoType



OBJECT ACL VERSIONS METHODS DO VIEW / DETAILS RELATIVES

View JSON JSON

Identifier

21.T11969/bcc54a2a9ab5b2a8f2c

Type Name *

FDO_Profile_Ref

please use printable ascii characters without blank

Description

Reference to the profile of the FDO in a registry

Provenance

The DTR on the FDO Roadmap

FDO_ConfigType_14

Id: 21.T11969/141bf451b18a79d0fe66

Type: Profile



OBJECT ACL VERSIONS METHODS DO VIEW / D

Identifier

21.T11969/141bf451b18a79d0fe66

Type Name *

FDO_ConfigType_14

please use printable ascii characters without blank

Description

Profile of an FDO that follows configuration type 14.

Provenance

Contributors

Name

Jana Böhm

Full name of the contributor

Creation Date

2024-02-20T10:11:53.016Z

Type *

Object

Necessary Field to include the type in the JSON output.

Allow additional Properties

true

Allow properties in an object in addition to those mentioned in the

Properties

Property 1

Name *

FDO_Profile_Ref

Type *

21.T11969/bcc54a2a9ab5b2a8f2c

Type Name: FDO_Profile_Ref

Properties

Const Value

21.T11969/141bf451b18a79d0fe66

Optional field. Sets a constant value that must be

Cardinality *

1

The cardinality of the property, also describes the

Property 2

Name *

FDO_Type_Ref

Type *

21.T11969/bcc54a2a9ab5b2a8f2c

FDO_Profile_Ref

Id: 21.T11969/bcc54a2a9ab5b2a8f2c

Type: BasicInfoType

OBJECT ACL VERSIONS METHODS DO VIEW / DETAILS RELATIVES

View JSON JSON

Identifier

21.T11969/bcc54a2a9ab5b2a8f2c

Type Name *

FDO_Profile_Ref

please use printable ascii characters without blank

Description

Reference to the profile of the FDO in a society

Type *

String

For type "Number", further differentiate between integer and float.

Properties

Properties *

Properties / RegEx

Property *

Value *

pattern

^[0-9.A-Z,a-z]+(\.[0-9.A-Z,a-z]+)*\.[0-9]+\$

The DTR on the FDO Roadmap

Handle Values for: 21.T11967/7cac06ea60e01a96ee02

Index	Type	Timestamp	Data
100	HS_ADMIN	2024-12-01 10:44:44Z	handle=0.NA/21.T11967; index=300; [create,admin,del admin,add admin,list] <locations> <location href="https://cordra.testbed.pid.4"> <location href="https://cordra.testbed.pid.4"> </locations>
1	10320/loc	2024-12-01 10:44:44Z	<location href="https://cordra.testbed.pid.4"> <location href="https://cordra.testbed.pid.4"> </locations>
2	id	2024-12-01 10:44:44Z	21.T11967/7cac06ea60e01a96ee02
3	name	2024-12-01 13:51:11Z	sensor_data_bme2080_26083_20241130
4	FDO_MD_Refs	2024-12-01 10:44:44Z	[21.T11967/5c17b5b735a90c555725]
5	FDO_Data_Refs	2024-12-01 10:44:44Z	[21.T11967/d174f6c0b2a4abda913b]
6	FDO_Profile_Ref	2024-12-01 10:44:44Z	21.T11969/141bf451b18a79d0fe66
7	FDO_Type_Ref	2024-12-01 10:44:44Z	21.1/sensordata
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9	modificationDate	2024-12-01 13:51:11Z	2024-12-01T13:51:11.612Z
10	createdBy	2024-12-01 13:51:11Z	admin
11	modifiedBy	2024-12-01 13:51:11Z	admin
12	FDO_Status	2024-12-01 13:51:11Z	created
13	FDO_Rights_Ref	2024-12-01 13:51:11Z	21.1/CC0
14	FDO_Genre_Ref	2024-12-01 13:51:11Z	21.1/thisIsAnFdoGenre
15	0.TYPE/DOIPService	2024-12-01 13:51:11Z	21.T11967/service

```
▼ Object
  @id: "21.T11969/141bf451b18a79d0fe66"
  type: "object"
  additionalProperties: true
  ► required: Array[3]
  ▼ properties: Object
    ► FDO_Profile_Ref: Object
    ► FDO_Type_Ref: Object
    ► FDO_Data_Refs: Object
    ► FDO_MD_Refs: Object
    ► FDO_Rights_Ref: Object
    ► FDO_Genre_Ref: Object
    ► FDO_Status: Object
  description: "Profile of an FDO that follows configuration type 14."
  title: "FDO_ConfigType_14"
  $schema: "http://json-schema.org/draft-04/schema#"
```

The DTR on the FDO Roadmap

Handle Values for: 21.T11967/7cac06ea60e01a96ee02

Index	Type	Timestamp	Data
100	HS_ADMIN	2024-12-01 10:44:44Z	handle=0.NA/21.T11967; index=300; [create admin,del admin,add admin,list] <locations> <location href="https://cordra.testbed.pid.4"> <location href="https://cordra.testbed.pid.4"> </locations>
1	10320/loc	2024-12-01 10:44:44Z	<location href="https://cordra.testbed.pid.4"> <location href="https://cordra.testbed.pid.4"> </locations>
2	id	2024-12-01 10:44:44Z	21.T11967/7cac06ea60e01a96ee02
3	name	2024-12-01 13:51:11Z	sensor_data_bme2080_26083_20241130
4	FDO_MD_Refs	2024-12-01 10:44:44Z	[21.T11967/5c17b5b735a90c555725]
5	FDO_Data_Refs	2024-12-01 10:44:44Z	[21.T11967/d174f6c0b2a4abda913b]
6	FDO_Profile_Ref	2024-12-01 10:44:44Z	21.T11969/141bf451b18a79d0fe66
7	FDO_Type_Ref	2024-12-01 10:44:44Z	21.1/sensordata
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10	createdBy	2024-12-01 13:51:11Z	admin
11	modifiedBy	2024-12-01 13:51:11Z	admin
12	FDO_Status	2024-12-01 13:51:11Z	created
13	FDO_Rights_Ref	2024-12-01 13:51:11Z	21.1/CC0
14	FDO_Genre_Ref	2024-12-01 13:51:11Z	21.1/thisIsAnFdoGenre
15	0.TYPE/DOIPService	2024-12-01 13:51:11Z	21.T11967/service

```
▼ Object
  @id: "21.T11969/141bf451b18a79d0fe66"
  type: "object"
  additionalProperties: true
  ▶ required: Array[3]
  ▼ properties: Object
    ▶ FDO_Profile_Ref: Object
    ▶ FDO_Type_Ref: Object
    ▶ FDO_Data_Refs: Object
    ▶ FDO_MD_Refs: Object
    ▶ FDO_Rights_Ref: Object
    ▶ FDO_Genre_Ref: Object
    ▶ FDO_Status: Object
  description: "Profile of an FDO that follows configuration type 14."
  title: "FDO_ConfigType_14"
  $schema: "http://json-schema.org/draft-04/schema#"
```

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eosc | **FAIRCORE4EOSC**
Core Components Supporting a FAIR EOSC

Data Typing Workflow in the context of FAIR Digital Objects

What are FAIR Digital Objects?

FAIR Digital Objects (FDOs) are self-contained, uniquely identifiable, and machine-actionable digital entities that support FAIR principles (Findable, Accessible, Interoperable, and Reusable). They can form the foundation for interoperable data exchange across disciplines, enabling automation, reproducibility, and reuse in scientific research.

Towards a FAIR Digital Ecosystem

Data typing through a Data Type Registry (DTR) is a fundamental component of building a truly FAIR, machine-actionable digital research infrastructure. Standardizing data types ensures that digital objects can be seamlessly reused, integrated, and processed in automated workflows.

A Data Typing Workflow

The diagram illustrates the workflow: **Create a Digital Object** leads to **Select an FDO Profile**, which leads to **Assign a PID to the FDO**. This step involves a **PID Record** (represented by a grid icon) and a **Metadata Profile** (represented by a cube and code icon). The **Assign a PID to the FDO** step also leads to **Validate the PID Record**. The **Validate the PID Record** step leads to **Create a Profile out of Types**, which leads to **Create Data Types in DTR**. The **Create Data Types in DTR** step leads to **Create a Digital Object**. The **Create a Digital Object** step leads to **FDO Fair Digital Object** (represented by a cube icon). The **FDO Fair Digital Object** is linked to **PID** (represented by a globe icon), which is linked to **PIDMR EOSC PID Meta Resolver** (represented by a globe icon with a star). The **PIDMR EOSC PID Meta Resolver** is linked to **DTR EOSC Data Type Registry** (represented by a cube icon with a star and code icon). The **DTR EOSC Data Type Registry** is linked to **Metadata Profile**.

The PID Meta Resolver to increase FAIRness after the FDO creation

Instead of relying on multiple PID resolvers, a PID Meta Resolver (PIDMR) can interpret different PID types and redirect users (or machines) to the correct metadata and data type. When queried, the resolver retrieves the associated metadata and structural information about the FDO. With structured metadata and a resolvable data type, the FDO becomes fully machine-actionable. The Meta Resolver helps achieve an increase in findability and accessibility, and thus the overall FAIRness of the ecosystem.

Funded by the European Union

DTR EOSC Data Type Registry | **PIDMR EOSC PID Meta Resolver**

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Panel Discussion

FAIRfest 20 February 2025
The Hague, The Netherlands (Madurodam)

Celebrating the advancements in FAIR solutions for EOSC

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