

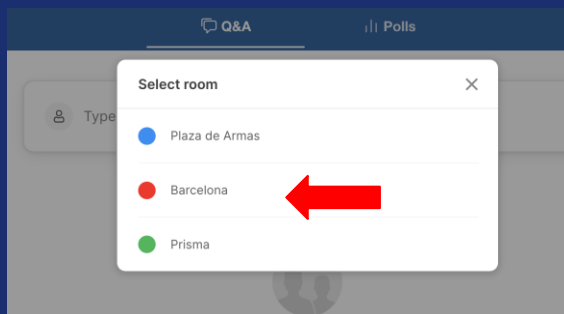
Semantic interoperability for data and metadata

21 September | 10.40 - 11.40

Join the discussion on Slido.com

Use the code: **EOSCsymposium23** or the QR code

Select the room: **Barcelona**



Slido.com -> Enter code: **EOSCsymposium23**

- Select room: **Barcelona**

Opening and introduction to the session

Presented by **Wolmar Nyberg Åkerström**



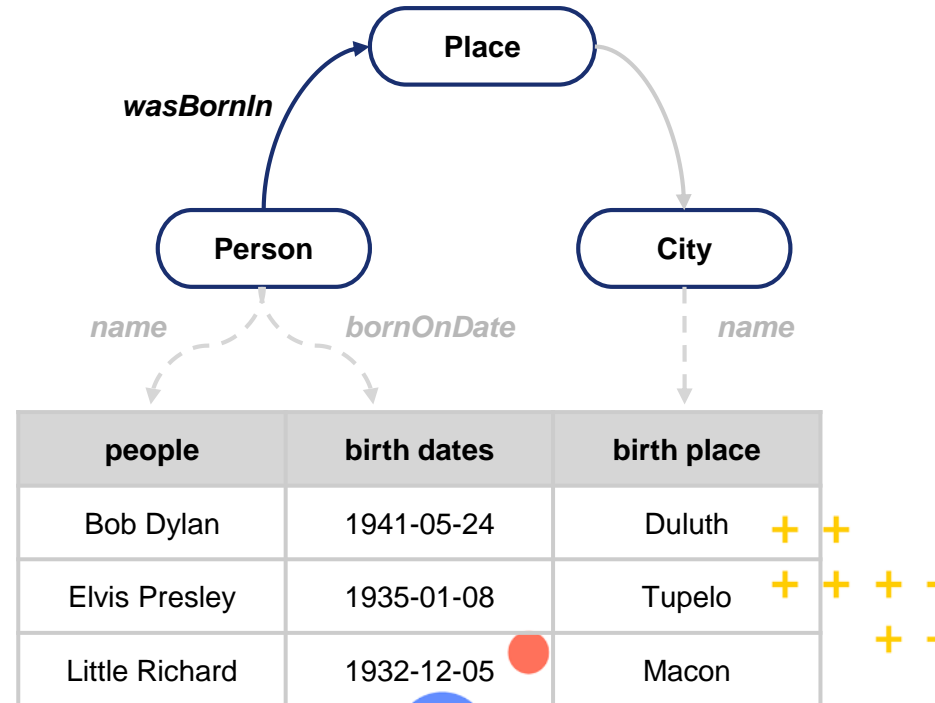
Room:
Barcelona



A web of FAIR data and services for research

“What is sent is what is understood”

- Semantic models connect data with relevant research concepts
- Used to translate and exchange information to support a variety of research related use cases
- Interoperability across tools, workflows and infrastructures



“We are EOSC”: A call to action for all of us

“From Gutenberg to Berners–Lee”

- Roadmap & priorities in the Strategic Research and Innovation Agenda (SRIA) for EOSC document
- Practices & skills
- Standards, tools & services
- Federated infrastructure

“[...] invest in the creation, adoption and governance of community-based metadata and data standards [...]”

“[...] semantic artefact catalogues in national infrastructures and guidelines”

“[...] support for publishing semantic artefacts through institutional or vocabulary specific thematic repositories”

Making sense of your group's data

“ data should be readable for machines without the need for specialised or ad hoc algorithms, translators, or mappings”



How about another group's data?

Making sense of another group's data

“ data should be readable for machines without the need for specialised or ad hoc algorithms, translators, or mappings”



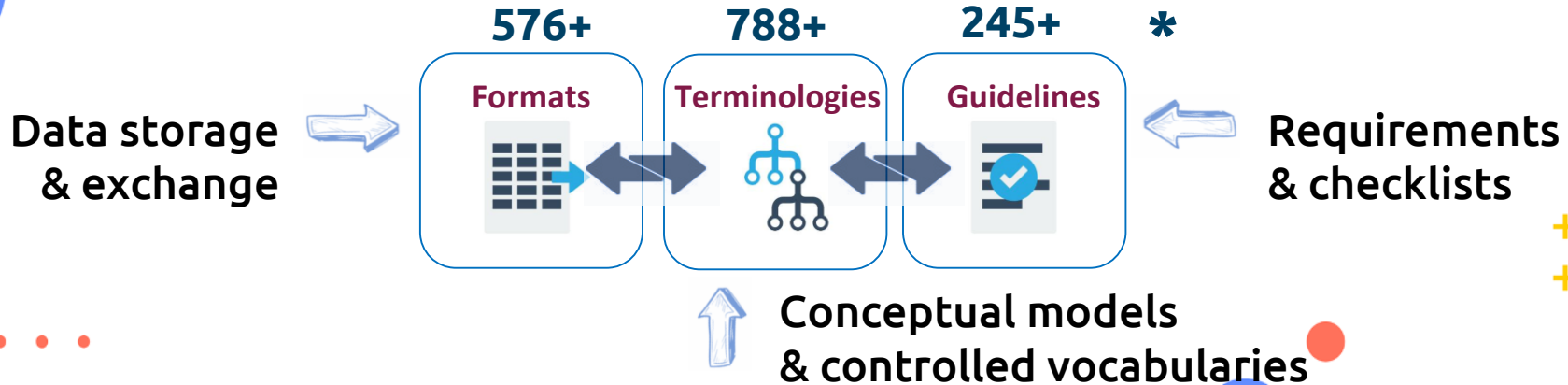
“ data should be assessable so that judgments can be made about their reliability and the competence of those who created them”.

How about Europe's research data?

Making sense of Europe's research data

“ data should be readable for machines without the need for specialised or ad hoc algorithms, translators, or mappings”

“ data should be assessable so that judgments can be made about their reliability and the competence of those who created them”.



* Numbers from the FAIRsharing Registry

Connecting the web of FAIR data and services

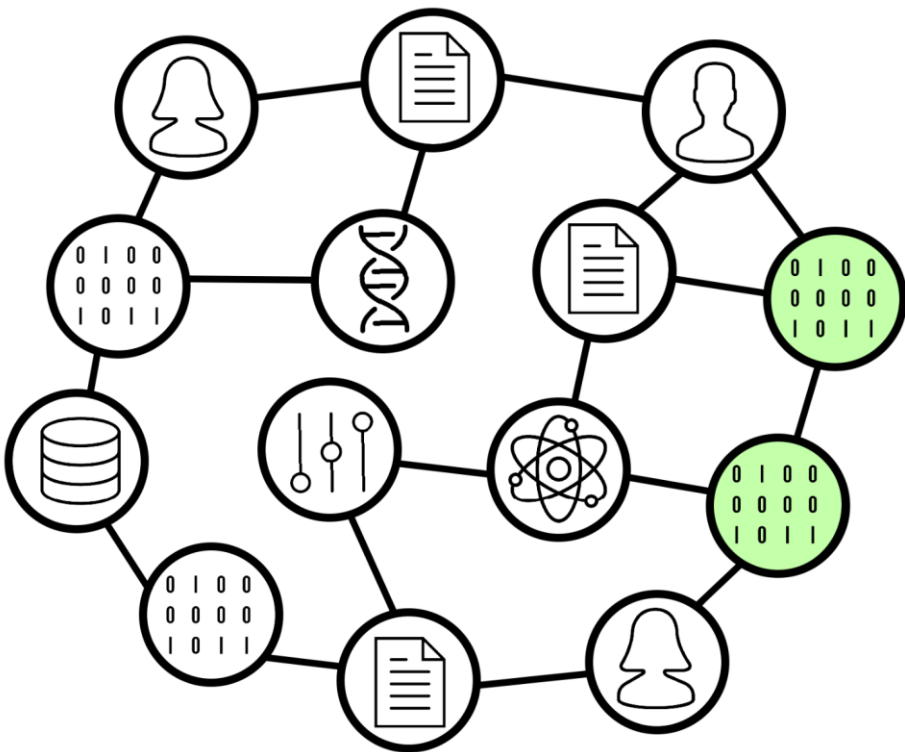




Illustration: "PID Graph" from the FREYA project





Highlight: FAIRCORE4EOSC




RDGraph
EOSC Research
Discovery Graph


 EOSC | FAIRCORE4EOSC
Enabling a FAIR EOSC ecosystem

The EOSC Research Discovery Graph will:


-  Provide regular data dumps and APIs to support data re-use
-  Facilitate the discovery of products and services
-  Enable community users to get recommendations for research product
-  Enable discovery, monitoring and access to research products and services



PIDGraph
EOSC PID
Graph

 EOSC | FAIRCORE4EOSC
Enabling a FAIR EOSC ecosystem

The EOSC PIDGraph will:

-  support service workflows for regularly generating data dumps related to community profiles for reuse by the EOSC community and related services

Leveraging communities and consensus

Enabling **reproducible**, transparent research.



 **researchobject.org**

<https://www.researchobject.org/>

Highlight: EOSC Association

Home / The Association / Task Forces

EOSC-A Task Forces



The 13 EOSC Association Task Forces address key areas of the implementation of EOSC.

They liaise with EOSC projects to offer feedback on developments, as well as identify strategic gaps and areas for investment to input to the **SRIA**, the EOSC Partnership's Strategic Research and Innovation Agenda. An open call was held to define the membership of the Task Forces. This resulted in several hundred members of the community offering their expertise as volunteers to shape the future direction of EOSC.

The work of the Task Forces is focused on the development and deployment of the European Open Science Cloud. The key high-level areas addressed include:



Semantic interoperability for data and metadata

Thursday 21 September

10:30-11:30 CEST

Room: Barcelona



8 min **Opening and introduction to the session**

Wolmar Nyberg Åkerström

8 min **Semantic artefacts and their representations**

Yann Le Franc

8 min **Catalogues of semantic artefacts and their governance**

Susanna-Assunta Sansone

8 min **Mappings, crosswalks and alignment**

Daan Broeder

8 min **Implementation examples**

Alexandra Kokkinaki

20 min **Q&A and Panel discussion: Opportunities to promote and converge on best practices**



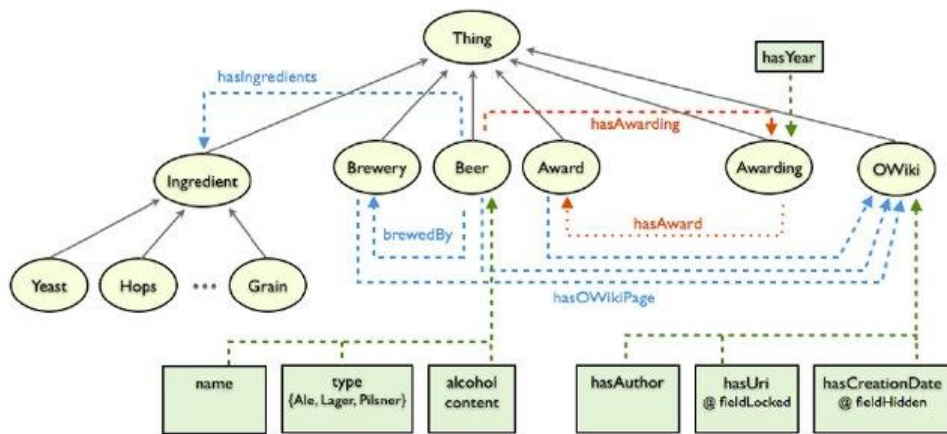


Semantic artefacts and their representations

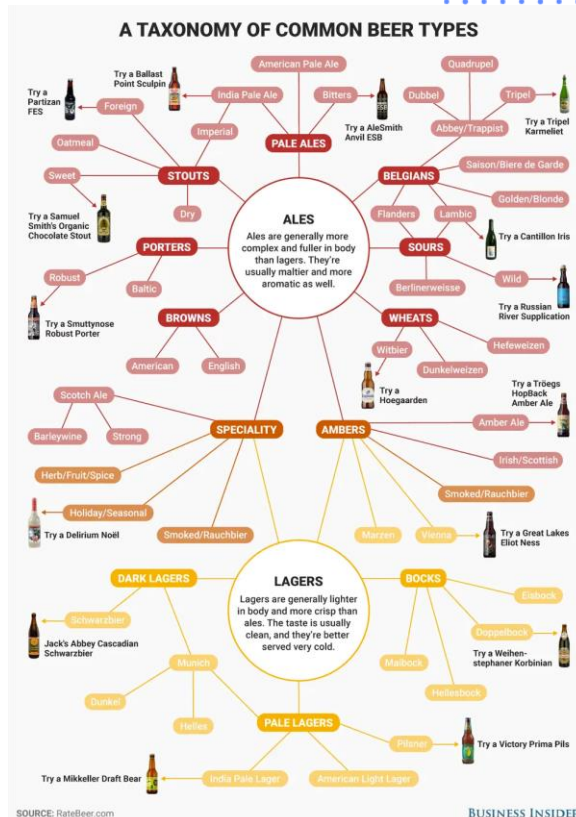
Presented by Yann Le Franc

What do semantic artefacts represent?

Conceptual models of the world which describes the concepts and their relations necessary to describe data and its context.



From Di Iorio, Angelo & Peroni, Silvio & Vitali, Fabio. (2012). OWiki: Enabling an Ontology-Led Creation of Semantic Data. 10.1007/978-3-642-23172-8_24.



SOURCE: RateBeer.com

BUSINESS INSIDER

from <https://www.businessinsider.com/different-types-of-beer-2016-13?r=US&IR=T>

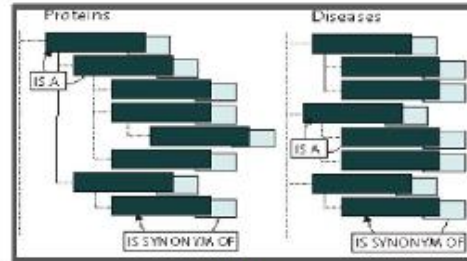
The diversity of Semantic artefacts

Controlled Vocabulary (CV):
An authoritative list of terms



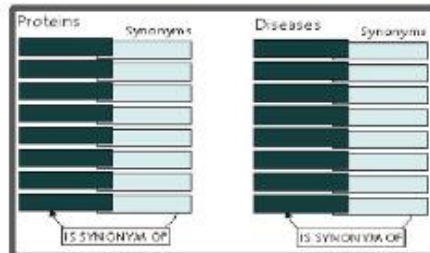
Taxonomy:

A CV with a tree-hierarchical (parent/child term) structure



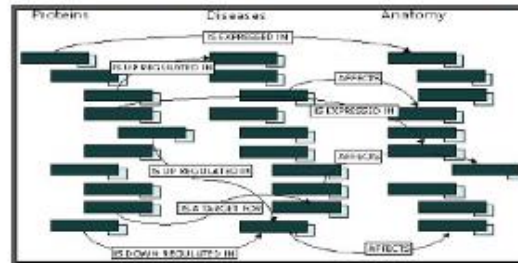
Thesaurus:

A kind of taxonomy with structure and specific types of relationships between terms



Ontology:

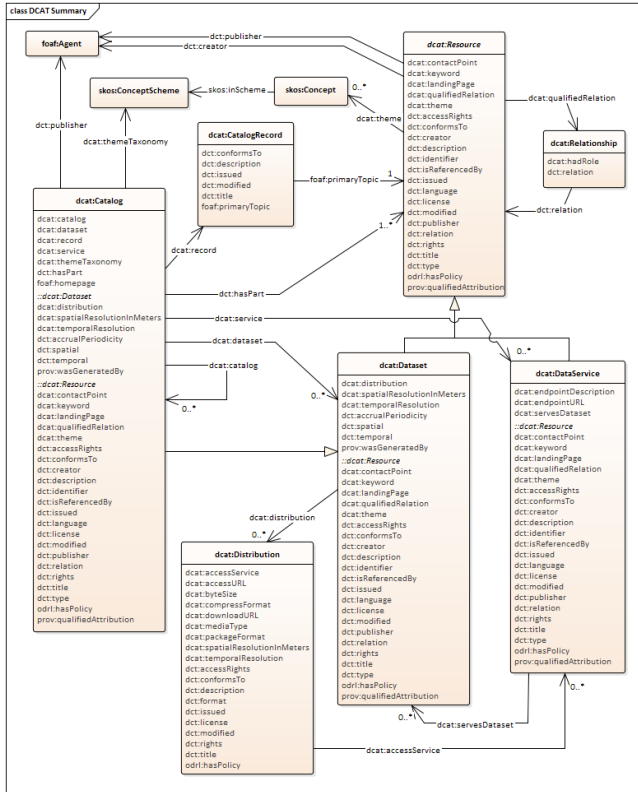
is a kind of taxonomy, but the types of relationships are greater in number and more specific in their function



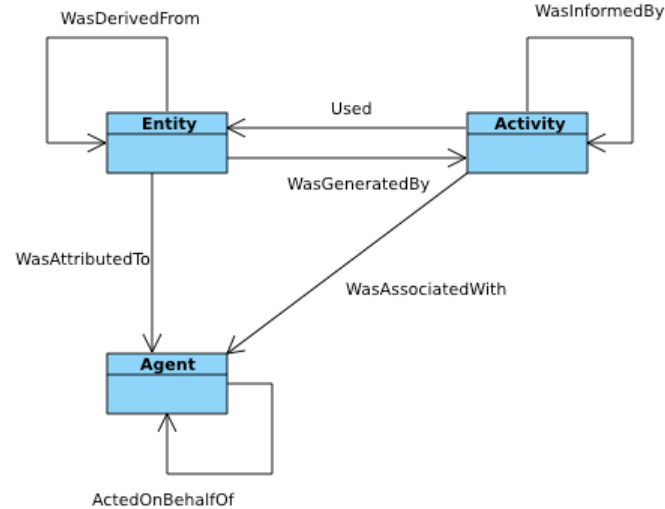
Examples of generic conceptual models



DCAT

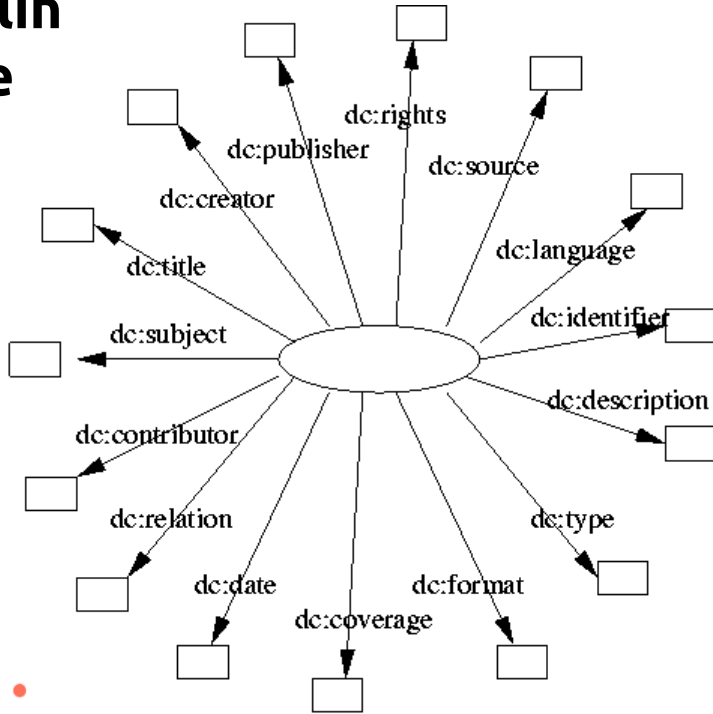


PROV



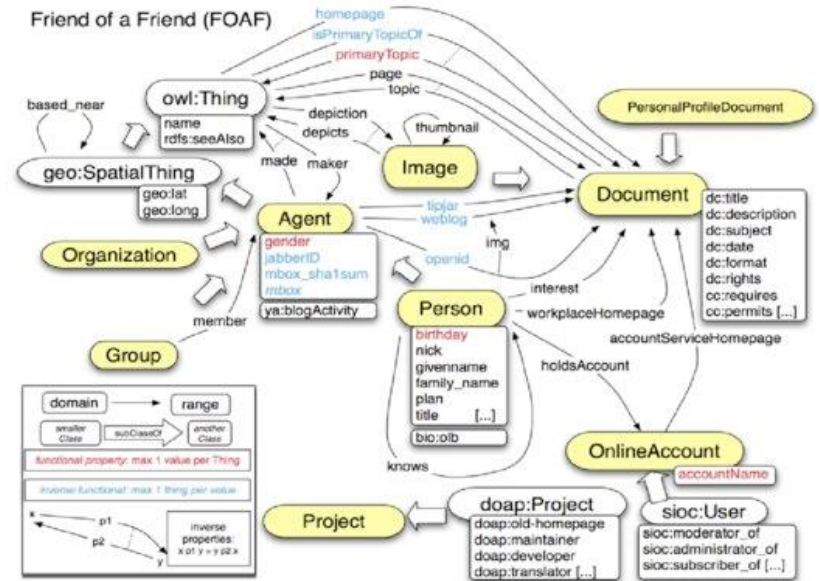
Examples of generic conceptual models

Dublin Core



<https://www.dublincore.org/specifications/dublin-core/dcq-rdf-xml/2001-08-29/>

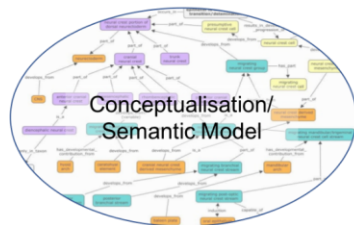
FOAF



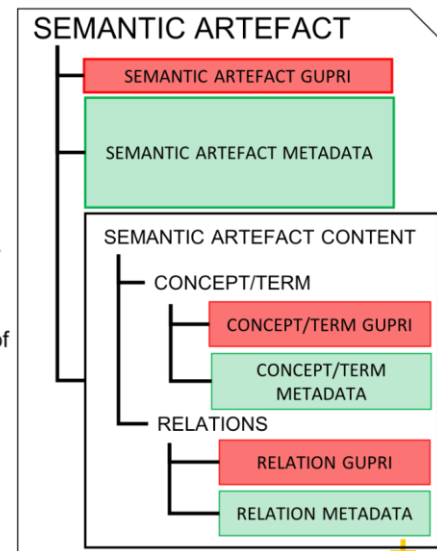
Chalenger, Moharram. (2012). The Ontology and Architecture for an Academic Social Network. International Journal of Computer Science Issues. 9.

What are semantic artefacts?

“A *semantic artefact* is defined within our 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 ...” - Yann Le Franc, Luiz Bonino, Hanna Koivula, Jessica Parland-von Essen, & Robert Pergl. (2022). D2.8 FAIR Semantics Recommendations Third Iteration (V1.0). Zenodo. <https://doi.org/10.5281/zenodo.6675295>



serialised as
→
←
is a serialisation of



What are the common representations?

A wide diversity of digital representation of the conceptual models.



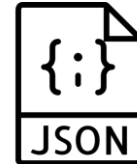
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LANGUAGE™



schema.org



<xml />



W3C[®]  OWL



W3C[®]  SKOS



Examples of practices in various communities

Biodiversity and environmental science

GBIF Repository of Schemas

GBIF Resources

Name	Last modified	Size
Parent Directory		-
distribution_status/	2022-02-22 11:35	-
establishment_means/	2022-02-22 11:35	-
occurrence_status/	2022-02-22 11:35	-
taxonomicStatus/	2022-02-22 11:35	-
agent_role.xml	2020-05-12 17:22	11K
dataset_subtype.xml	2020-05-12 17:22	6.6K
dataset_type.xml	2020-05-12 17:22	3.2K
dataset_type_2015-07-10.xml	2020-05-12 17:22	3.8K
description_type.xml	2020-05-12 17:22	15K
direction.xml	2020-05-12 17:22	6.2K
distribution_status_2020-07-15.xml	2020-07-15 10:32	4.5K
establishment_means.xml	2020-05-12 17:22	3.3K
life_form.xml	2020-05-12 17:22	4.0K
life_stage.xml	2020-05-12 17:22	12K
nomenclatural_code.xml	2020-05-12 17:22	3.8K
nomenclatural_status.xml	2020-05-12 17:22	18K
nomenclatural_status_2019-02-08.xml	2020-05-12 17:22	18K
occurrence_status.xml	2020-05-12 17:22	4.5K
occurrence_status_2020-07-15.xml	2020-07-15 10:32	1.3K
preservation_method.xml	2020-05-12 17:22	6.7K
quantity_type_2015-07-10.xml	2020-05-12 17:22	7.0K
quantity_type_2023-02-28.xml	2023-02-28 13:36	7.5K
rank.xml	2020-05-12 17:22	20K
rank_2015-04-24.xml	2020-05-12 17:22	25K
reference_type.xml	2020-05-12 17:22	3.8K
resource_type.xml	2020-05-12 17:22	4.6K

<xml />

Examples of practices in various communities

Biodiversity and environmental science

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establishment_means/	2022-02-22 11:35	-
occurrence_status/	2022-02-22 11:35	-
taxonomicStatus/	2022-02-22 11:35	-
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reference_type.xml	2020-05-12 17:22	3.8K
resource_tvpe.xml	2020-05-12 17:22	4.6K

ELTER Vocabularies

Vocabularies About Help | auf Deutsch

EnvThes - Thesaurus for long term ecological research, monitoring and experiments

Content language English

Alphabetical Hierarchy

A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z M !* 0-9

A horizon
A layer → A horizon
abiotic environment
abiotic heterogeneity
ABL → atmospheric boundary layer
above ground
above ground biomass
above ground net primary production
above-ground net primary production
aboveground net primary production → above ground net primary production
aboveground production
absorbed
absorbed dose
absorbed dose rate
absorption
absorption coefficient
absorptive coefficient → absorption coefficient
absorbivity coefficient → absorption coefficient
abundance
abundance estimate
abundance of animal species → animal species abundance
abundance of bacillariophyceae → bacillariophyceae abundance
abundance of bacteria → bacteria abundance
abundance of benthic invertebrates → benthic

Vocabulary information

TITLE EnvThes - Thesaurus for long term ecological research, monitoring and experiments
Environmental Thesaurus

DESCRIPTION Thesaurus for long term ecological research, monitoring, experiments




CREATOR <https://orcid.org/0000-0003-2195-3997>

RIGHTS <https://spdx.org/licenses/CC0-1.0>

TYPE <http://www.w3.org/2004/02/skos/core#ConceptScheme>

URI <http://vocabs.lter-europe.net/EnvThes/>

Download this vocabulary: **TURTLE**



<xml />

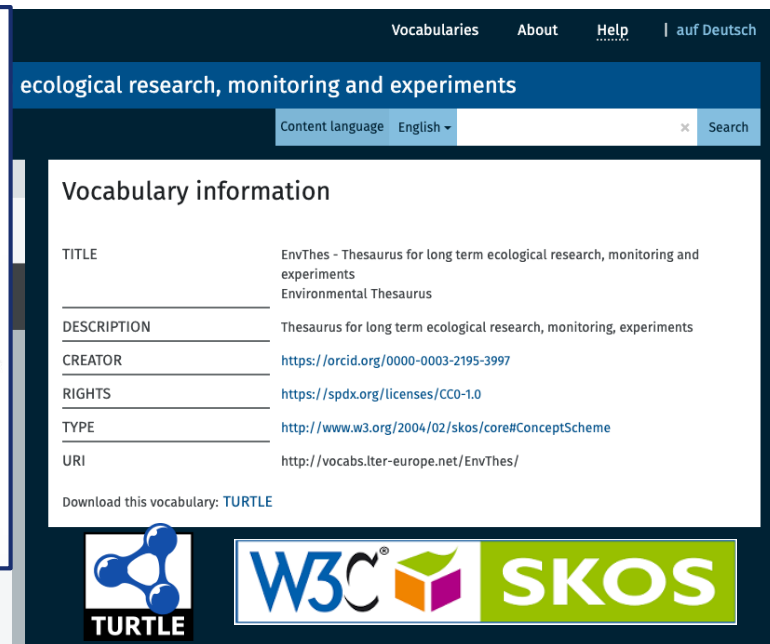
Examples of practices in various communities

Biodiversity and environmental science



The Environment Ontology website features a navigation menu on the left with links to 'The Environment Ontology', 'About EnvO', 'Annotation guidelines', 'Browse EnvO', 'Downloads', 'Participate', and 'Contact'. The main content area displays the 'W3C OWL' logo and the title 'The Environment Ontology' above a background image of a forest. Below the title, there is a list of XML files with their respective dates, times, and sizes.

 nomenclatural_status_2019-02-08.xml	2020-05-12 17:22	18K
 occurrence_status.xml	2020-05-12 17:22	4.5K
 occurrence_status_2020-07-15.xml	2020-07-15 10:32	1.3K
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 quantity_type_2015-07-10.xml	2020-05-12 17:22	7.0K
 quantity_type_2023-02-28.xml	2023-02-28 13:36	7.5K
 rank.xml	2020-05-12 17:22	20K
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 reference_type.xml	2020-05-12 17:22	3.8K
 resource_tvpe.xml	2020-05-12 17:22	4.6K



The screenshot shows the 'Vocabulary information' page for 'EnvThes - Thesaurus for long term ecological research, monitoring and experiments'. The page includes a search bar at the top with 'Content language English' and a 'Search' button. The main content area lists metadata for the vocabulary, including title, description, creator, rights, type, and URI. Below the metadata, there is a 'Download this vocabulary: Turtle' link and logos for 'TURTLE', 'W3C SKOS', and 'EnvO'.

Vocabularies About Help | auf Deutsch

ecological research, monitoring and experiments

Content language English x Search

Vocabulary information

TITLE	EnvThes - Thesaurus for long term ecological research, monitoring and experiments Environmental Thesaurus
DESCRIPTION	Thesaurus for long term ecological research, monitoring, experiments
CREATOR	https://orcid.org/0000-0003-2195-3997
RIGHTS	https://spdx.org/licenses/CC0-1.0
TYPE	http://www.w3.org/2004/02/skos/core#ConceptScheme
URI	http://vocabs.lter-europe.net/EnvThes/

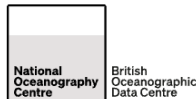
Download this vocabulary: Turtle

TURTLE W3C SKOS

<xml />

Examples of practices in various communities

Marine, Agriculture, Food, Biomedical science



The NERC Vocabulary Server (NVS)

Service Status

[NVS Home](#) | [Vocabularies](#) | [Thesauri](#) | [Search NVS](#) | [SPARQL](#) | [Other Tools](#) | [About NVS](#)

NVS Vocabularies

URI

<http://vocab.nerc.ac.uk/collection/>

Description

SKOS concept collections held in the NERC Vocabulary Server. A concept collection is useful where a group of concepts shares something in common, and it is convenient to group them under a common label. In the NVS, concept collections are synonymous with controlled vocabularies or code lists. Each collection is associated with its governance body. An external website link is displayed when applicable.



Alternate Formats

Other formats for this page:

[RDF/XML](#) [Turtle](#) [JSON-LD](#)

Alternate Profiles

Other views of this page:

[Alternate Profiles ?](#)

Filter

[Filter](#) [Clear ?](#)

Vocabularies

Sort by click on table headings, Filter using the search to the right.

ID ↑	Title ↑	Version ↑	Version Date ↑	Description ↑	Governance ↑	External Link ↑
C30	Active vocabulary content governance authorities	38	2023-09-06	Bodies responsible for the intellectual control of vocabularies served by the NDG/SeaDataNet vocabulary server.	British Oceanographic Data Centre	
C34	Activity purpose categories	4	2011-08-27	Terms used to specify why an activity was undertaken. Codes to indicate the best estimate	SeaDataNet	

Examples of practices in various communities

Marine, Agriculture, Food, Biomedical science



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NVS Home | Vocabularies | Thesauri | Search NVS | SPARQL | Other Tools | About

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AgroPortal [Browse](#) [Search](#) [Mappings](#) [Recommender](#) [Annotator](#) [Projects](#) [Landscape](#)

Category

- Natural Resources, ... (17)
- Physical and Chem... (1)
- Plant Anatomy and... (8)
- Plant Genetic Reso... (6)
- Plant Phenotypes a... (45)
- Plant Science and ... (13)
- Rural and Agricultu... (0)
- Taxonomic Classifi... (8)

Group

- AGBIODATA (23)
- AGROLD (6)
- CROP (38)
- INRAE (33)
- OBO-FOUNDRY (25)
- RICE (23)
- SEMANDIV (11)
- WHEAT (18)

Format

- OBO (12)
- OWL (122)
- SKOS (19)
- UMLS (2)

Agriculture and Forestry Ontology (AFO)

The Agriculture and Forestry Ontology (AFO) is based on the Agriforest thesaurus maintained by the Viikki Campus Library, University of Helsinki

Uploaded: 12/27/18

concepts **31,991**
FAIR score **216**

Meat Thesaurus (MEAT-T)

at this thesaurus describes different facets of the meat production chain, such as the market, breed, slaughtering, culinary preparations, etc

Uploaded: 2/13/22

concepts **1,505**
FAIR score **282**

AnaEE Thesaurus (ANAEETHES)

The AnaEe thesaurus aims to provide a controlled vocabulary for the semantic description of the study of continental ecosystems and their biodiversity

Uploaded: 12/12/20

concepts **3,247**
FAIR score **301**

projects **4**

Wheat Thesaurus

WheatF describ affect tl

Uploaded: [date]

FAIR score **223**

projects **5**

Examples of practices in various communities

Marine, Agriculture, Food, Biomedical science

OBO Foundry About Principles Ontologies Citation Participate Newsletter FAQ

Search Ontobee

Open Biological and Biomedical Ontology Foundry
Community development of interoperable ontologies for the biological sciences

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- [Submit your ontology to be considered for inclusion in the OBO Foundry](#)

OBO Library: find, use, and contribute to community ontologies

Download table as: [[YAML](#) | [JSON-LD](#) | [RDF/Turtle](#)]

Search Table

Search table ...

Ontology Domains:

Group By Domain

Hide Inactive

Hide Obsolete

Upper

ID ^	Title ^	Description	Quick Access	Re-Use ^	Social
bfo	Basic Formal Ontology	The upper level ontology upon which OBO Foundry ontologies are built.	↑ ↓ 🔍 📄 📁	BY	Stars: 224
cob	Core Ontology for Biology and Biomedicine	COB brings together key terms from a wide range of OBO projects to improve interoperability.	↑ ↓ 🔍 📄 📁	BY	Stars: 30
ro	Relation Ontology	Relationship types shared across multiple ontologies	↑ ↓ 🔍 📄 📁	BY	Stars: 79

C34	Activity purpose categories	4	2011-08-27	Terms used to specify why an activity was undertaken.	SeaDataNet
-----	-----------------------------	---	------------	---	------------

Codes to indicate the best estimate



Commenter Annotator Projects Landscape

Forest Ontology (AFO)

concepts: 31,991
FAIR score: 216

Forest Ontology (AFO) is based on the Agriforest thesaurus from the Finnish Campus Library, University of Helsinki

Meat Ontology (MEAT-T)

concepts: 1,505
FAIR score: 282

Meat Ontology (MEAT-T) describes different facets of the meat production chain, such as the breeding, slaughtering, culinary preparations, etc

Terrestrial Ecosystems Ontology (ANAETHES)

concepts: 3,247
FAIR score: 301

Terrestrial Ecosystems Ontology (ANAETHES) aims to provide a controlled vocabulary for the semantic study of continental ecosystems and their biodiversity

projects: 4

FAIR score: 223

projects: 5

Agri-Ontology (AGPO)

classes: FAIR score

Examples of practices in various communities

Marine, Agriculture, Food, Biomedical science

OBO Foundry [About](#) [Principles](#) [Ontologies](#) [Citation](#) [Participate](#) [Newsletter](#) [FAQ](#)

Open Biological and Biomedical Ontology Foundry
Community development of interoperable ontologies for the

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Download table as: [[YAML](#) | [JSON-LD](#) | [RDF/Turtle](#)]

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C34	Activity purpose categories	4	2011-08-27	Terms used to specify why an activity was undertaken.	SeaData
---------------------	-----------------------------	---	------------	---	---------

Codes to indicate the best estimate



BioPortal [Ontologies](#) [Search](#) [Annotator](#) [Recommender](#) [Mappings](#)

Category

- All Organisms (44)
- Anatomy (78)
- Animal Development (13)
- Animal Gross Anatomy ...
- Arabidopsis (2)
- Biological Process (58)

Group

- BIBLIO (10)
- BIS (3)
- CGIAR (1)
- CTSA (6)
- OBO_Foundry (11)
- PSI (4)

Format

- OBO (103)
- OWL (786)
- SKOS (103)
- UMLS (31)

RxNORM (RXNORM)

RxNorm Vocabulary

Uploaded: 8/7/23

projects: 7
classes: 107,690

National Drug Data File (NDDF)

National Drug Data File Plus Source Vocabulary

Uploaded: 8/7/23

projects: 1
classes: 31,518

Read Codes, Clinical Terms Version 3 (CTV3) (RCD)

Clinical Terms Version 3 (CTV3) (Read Codes) (Q199): National Health Service National Coding and Classification Centre

Uploaded: 8/7/23

projects: 2
classes: 140,065

Foundational Model of Anatomy (FMA)

FMA is a domain ontology that represents a coherent body of explicit declarative knowledge about human anatomy

Uploaded: 5/13/19

instances: 2
classes: 104,721

projects: 17

Medica

Medical S

Uploaded: 1



classes: 352,426

notes: 2

Logical Observation Identifier Names and Codes (LOINC)

Logical Observation Identifier Names and Codes (LOINC)

Uploaded: 8/7/23

projects: 8
classes: 285,529

Examples of practices in various communities

Linguistics, Humanities



[introduction](#)
[vocabularies](#)
[usage](#)
[API](#)
[FAQ](#)
[publications](#)
[contact](#)
[acknowledgements](#)
[change log](#)

CLAVAS: vocabulary service



Introduction

[CMDI 1.2](#) adds the ability to link external vocabularies to a [Component Metadata](#) profile. Currently the CLARIN [Component Registry](#) only supports vocabularies from CLAVAS!

Vocabularies

Currently the following vocabularies are offered:

[ISO 639-3](#) ([hdl:11459/CLAVAS_810f8d2a-6723-3ba6-2e57-41d6d3844816](#))

Codes for the representation of names of languages - Part 3: Alpha-3 code for comprehensive coverage of languages. ISO 639-3 attempts to provide as complete an enumeration of languages as possible, including living, extinct, ancient, and constructed languages, whether major or minor, written or unwritten. This vocabulary of ISO 639-3 codes is aligned with the CMDI Component [iso-639-3](#) ([clarin.eu:cr1:c_1271859438110](#)).

And the following vocabularies are being discussed or under construction:

licenses
organizations
media types (also known as MIME types)



Examples of practices in various communities

Linguistics, Humanities



- [Introduction](#)
- [vocabularies](#)
- [usage](#)
- [API](#)
- [FAQ](#)
- [publications](#)
- [contact](#)
- [acknowledgements](#)
- [change log](#)

CLAVAS: vocabularies

Consortium of European Social Science Data Archives

Account



Find Controlled Vocabulary

English (en)

Home About User Guide

Introduction

[CMDI 1.2](#) adds the ability to link external

Vocabularies

Currently the following vocabularies are available:

[ISO 639-3 \(hdl:11459/CLAVAS_810f8d\)](#)
Codes for the representation of n of languages as possible, including with the CMDI Component [iso-63](#)

And the following vocabularies are being developed:

licenses
organizations
media types (also known as MIME types)

33 Vocabularies

Results per page 30

Sort by CV name (A-Z)

Agency

Search agencies

gesis

[Central concepts of RjEX research \(rexconcepts\)](#)

This CV, developed within the framework of the DP-RjEX joint project, maps the central concepts and theoretical approaches in research on racism and right-wing extremism. The compilation is based on a systematic evaluation of the relevant national and international empirical research literature. The CV equally takes into account the different thematic (racism, right-wing extremism, discrimination) as well as methodological (qualitative research, standardised surveys, data from social media and messaging services) research strands.

Version: 1.2.0 [Download](#)

DE EN



[Aggregation Method \(AggregationMethod\)](#)

Identifies the type of aggregation used to combine information at a broader level than the level at which detailed observations are taken.

EN DA NO



Version: 1.1.2 [Download](#)



[Analysis Unit \(AnalysisUnit\)](#)

Describes the entity being analyzed in the study or variable. This vocabulary can also be used to describe the unit of observation, which is the unit being observed, or from which data are collected. The unit of observation can be the same as, or different from the unit of analysis.

Version: 2.1.3 [Download](#)

Examples of practices in various communities

Linguistics, Humanities

CLAVAS: vocabulary Consortium of European Social Science Data Archives Account

Vocabs Vocabularies About Editor API Help | Interface language: English

EOSC Resource Category, Subcategory (and Supercategory)

Content language English Search

Sort by CV name (A-Z)

Alphabetical Hierarchy

A B C D E F G H I J L M N O P Q
R S T U V W 0-9

Access
Access physical & infrastructures
Accounting
Aggregators & Integrators
Aggregators & Integrators
Analysis
Analysis
Analysis
Annotation
Anonymisation
APIs Repository/Gateway
Application Optimisation
Application Scaling
Application_Porting
Applications
Applications
Applications Repository
Archive

Vocabulary information

TITLE
EOSC Resource Category, Subcategory (and Supercategory)
EOSC Resource Category List

DESCRIPTION
EOSC Resource Category List compiled from <https://api.eosc-portal.eu/vocabulary/byType/SUPERCATEGORY>, <https://api.eosc-portal.eu/vocabulary/byType/CATEGORY>, and <https://api.eosc-portal.eu/vocabulary/byType/SUBCATEGORY>

TYPE
<http://www.w3.org/2004/02/skos/core#ConceptScheme>

DESCRIPTION
EOSC Resource Category List compiled from <https://api.eosc-portal.eu/vocabulary/byType/SUPERCATEGORY>, <https://api.eosc-portal.eu/vocabulary/byType/CATEGORY>, and <https://api.eosc-portal.eu/vocabulary/byType/SUBCATEGORY>

URI
<https://vocabs.sshopencloud.eu/vocabularies/eosc-resource-category/eoscResourceCategoryScheme>

Resource counts by type

approaches in research on racism and right-empirical research literature. The CV equally (qualitative research, standardised surveys, Version: 1.2.0 [Download](#)

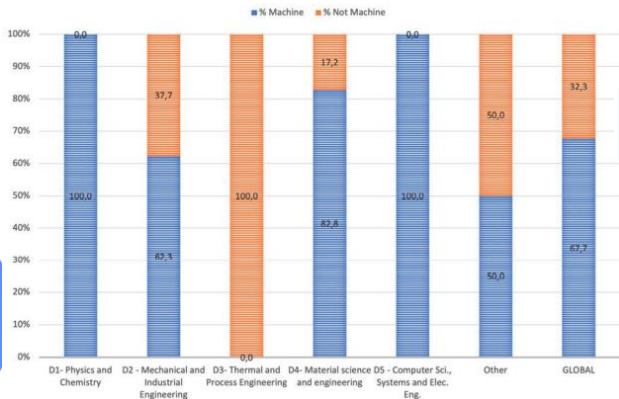
information at a broader level Version: 1.1.2 [Download](#)

t of observation, which is the unit being observed, or from which data are collected. The unit of observation can be the same as, or different from the unit of analysis. Version: 2.1.3 [Download](#)

Examples of practices in various communities

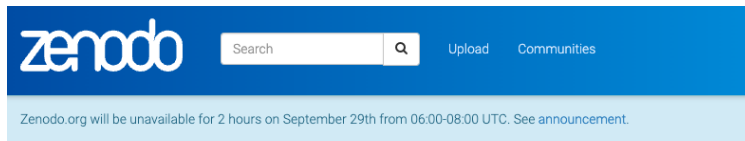
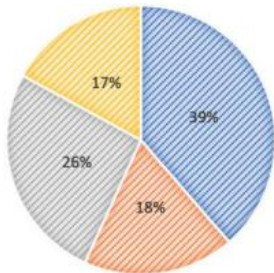
Material Science and Manufacturing

MACHINE READABLE VS. NOT MACHINE READABLE



GLOBAL SERIALIZATION DISTRIBUTION

■ % RDF/XML ■ % OWL/XML ■ % Turtle ■ % MultiSyntax



March 9, 2022

Project deliverable Open Access

OntoCommons D3.2 - Report on existing domain ontologies in

Yann Le Franc

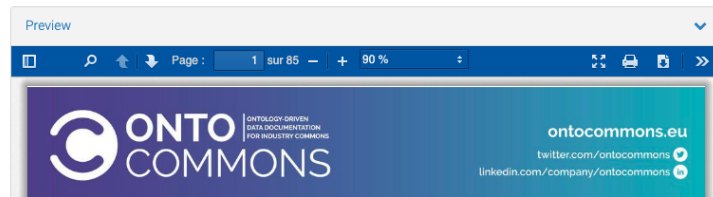
Project manager(s)

Hedi Karray

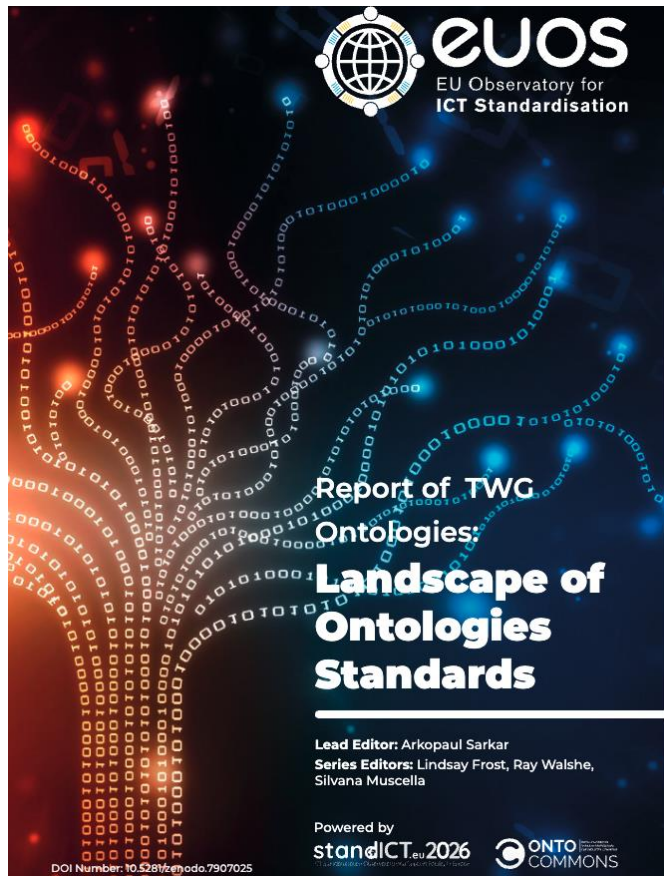
Project member(s)

Gerhard Goldbeck; Arkopaul Sarkar; Jesper Friis; Maria Poveda Villalon; Alba Fernández Izquierdo; Emna Amdouni; Emilio Sanfilippo

OntoCommons aims at defining a semantic interoperability framework to support the documentation of industrial data with ontologies. This document summarises the landscape analysis on domain ontologies. The scope of this analysis covers the domains of Physics and Chemistry, Mechanical and Industrial Engineering, Materials Science and Engineering, Thermal and Process Engineering, and Computer Science, Systems and Electrical Engineering. A dataset of 130 ontologies has been created based on expert inputs collected during workshops and surveys. Using this dataset, we collected information both manually and automatically to better describe the landscape (number of ontologies by domains, usage of Top-Level Ontologies, serialisation, complexity, compliance to FAIR principles, domain coverage, etc.). This first analysis highlighted the strong heterogeneities within and among the different domains and the low level of compliance to FAIR principles for each community.



Semantic artefacts as part of standardisation landscape



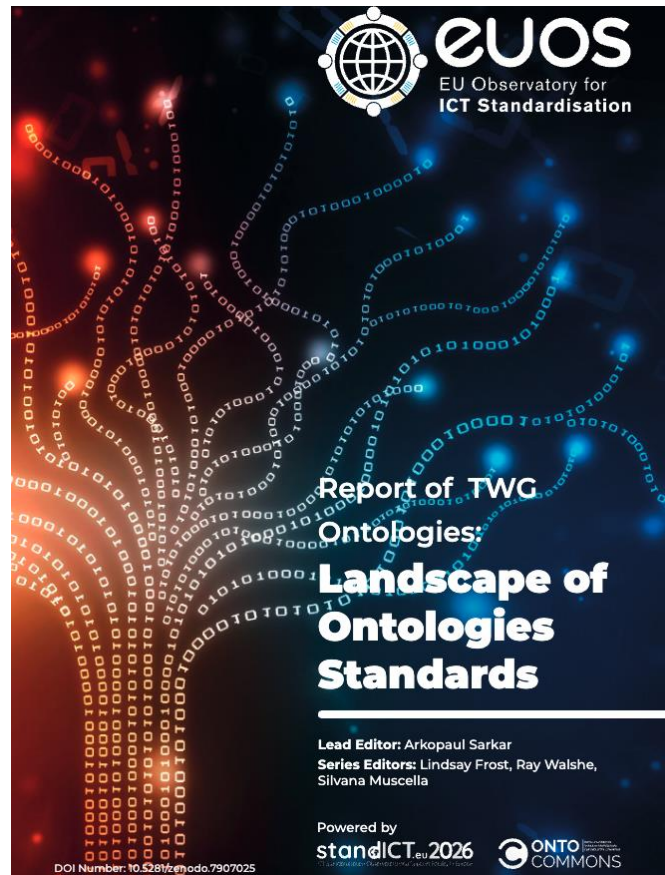
StandICT.eu, Sarkar, Arkopaul, Frost, Lindsay, Walshe, Ray, & Muscella, Silvana. (2023). Report of TWG Ontologies: Landscape of Ontologies Standards. Zenodo. <https://doi.org/10.5281/zenodo.7907025>

Semantic artefacts as part of standardisation landscape

Large diversity of Semantic Artefact representations, coupled with difficulty to find, interoperate and reuse which impair semantic interoperability

How can we resolve this situation?

StandICT.eu, Sarkar, Arkopaul, Frost, Lindsay, Walshe, Ray, & Muscella, Silvana. (2023). Report of TWG Ontologies: Landscape of Ontologies Standards. Zenodo. <https://doi.org/10.5281/zenodo.7907025>



Applying the FAIR principles to semantic artefacts



- 17 generic recommendations and 12 Best Practices
- Recommendation aligned with RFC 2119 (MUST, SHOULD, MAY)
 - 9 MUST
 - 7 SHOULD
 - 1 MAY
 - 1 Undetermined
- Minimum metadata profile for

FAIR Semantic Artefacts

Clement Jonquet, Biswanath Dutta, Luiz O. Bonino da Silva Santos, Robert Pergi, Yann Le Franc. Common Minimum Metadata for FAIR Semantic Artefacts. 2nd Workshop on Ontologies for FAIR and FAIR Ontologies (Onto4FAIR), Cassia Trojahn; Luiz Olavo Bonino da Silva Santos; Giancarlo Guizzardi; Clement Jonquet, Jul 2023, Sherbrooke, Canada. (hal-04106533v2)

The screenshot shows a Zenodo record for the document 'D2.8 FAIR Semantics Recommendations Third Iteration'. The record is dated February 25, 2022, and is marked as 'Project deliverable' and 'Open Access'. It has 207 views and 175 downloads. The authors listed are Yann Le Franc, Luiz Bonino, Hanna Kraljic, Jessica Parland-von Esann, and Robert Pergi. The abstract states that this is the third and final iteration of recommendations for making semantic artefacts FAIR, based on discussions with experts and previous work. It includes 17 preliminary recommendations and 10 best practice recommendations. The work is published on GitHub and uses GitHub's issue tracking feature for community feedback. The record is associated with the OpenAIRE project and has a DOI of 10.5281/zenodo.6675295. The keywords are FAIRSFair, FAIR Data, and Semantic artefacts.

<https://doi.org/10.5281/zenodo.6675295>

Summary of the recommendations



- Usage of globally unique persistent and resolvable identifiers for semantic artefacts, their content (i.e. concept/term/class and relation) and their version,
- Minimum machine-readable metadata to describe the semantic artefacts themselves and their content,
- Usage of **repositories/catalogs** to share, publish and retrieve semantic artefacts and their content
- Defining common API(s) to access and index semantic artefacts and their content,
- Interoperability approaches to make sure that semantic artefacts of various degrees of complexity and encoding format should work together including **publishing FAIR mappings and crosswalks** between semantic artefacts,
- Semantic artefacts and their content should be retrievable through search engines.

Related ongoing work

FAIR Impact

- M5.3 Semantic artefact assessment methodology: <https://zenodo.org/record/8305173>
- Common metadata schema for Semantic Artefact
- Semantic artefact governance
- FAIR Mappings
- Semantic artefact catalogs/repositories

FAIRCORE4EOSC - MSCR

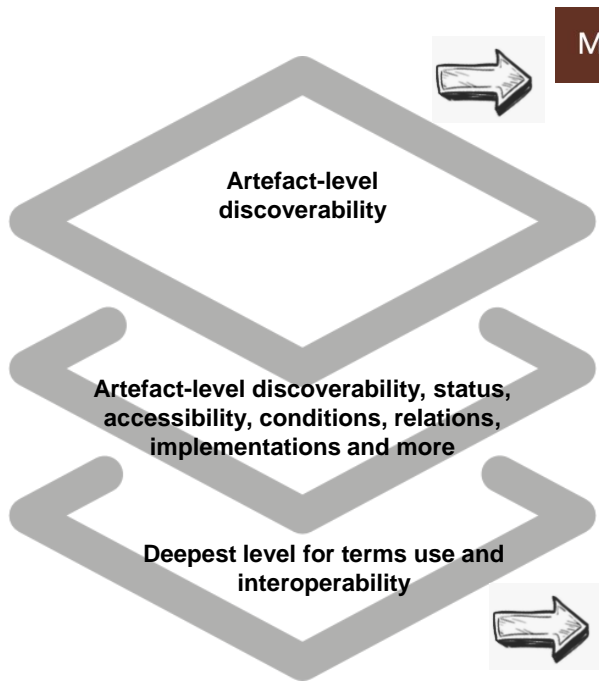


Catalogues of semantic artefacts and their governance

Presented by Susanna-Assunta Sansone



Types of catalogues/registries - examples

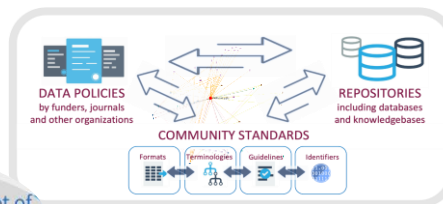


Metadata Standards Catalog

<https://rdamsc.bath.ac.uk/>

FAIRsharing.org

FAIRsharing provides a snapshot of the **dynamic landscape** of standards



1. Tracks their **evolution**
2. Illustrates **relations** with other standards
3. Displays their **implementation** in databases
4. Monitors their **adoption** in data policies and guidelines

<https://fairsharing.org/>

BioPortal

Ontologies Search Annotator Recommender Mappings

<https://bioportal.bioontology.org/>



Sustainability aspects

Content



Technical



Embedding

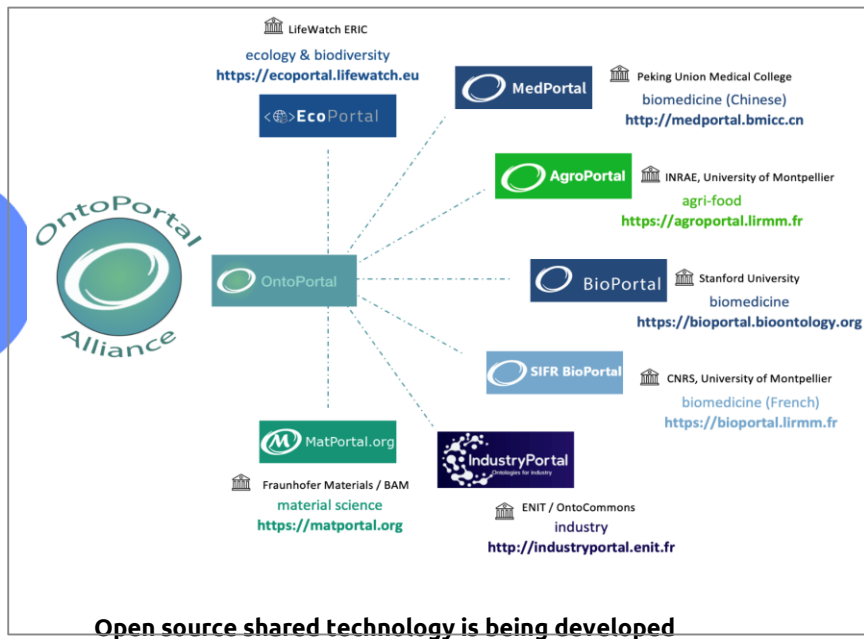


Endorsements



People and funds

Software diversity - examples



FAIRsharing.org

Findability XML Schema.org doi ORCID	Sitemap.xml, JSON Markup with Schema.org for search indexes DOI unique persistent identifiers for each record ORCID trusted party	Interoperability JSON markup Standardized semantics Cross-links to records in other registries ROR for organizations FundRef for funders (ongoing)
Accessibility {REST}	REST Web Services	Reusability CC BY 4.0 license

Relational and graph database

Metadata Standards Catalog

Github, API

Governance challenges - CLARIN example

- **CLARIN's goal: make metadata profiles and language data explicit:**
 - Collaboration with ISO TC37 to try to use the ISOcat Data Category Registry¹
 - too complicated/formalised ISO procedures to add/change concepts
 - categories (semantic artefacts/data model) not the concepts CLARIN needed
 - work too demanding, but useful in terms of what costs/efforts are involved
 - culture clash between the research community's dynamic needs and ISO's slow pace
 - Creation of the CLARIN Concept Registry², pragmatic and experts-driven
 - a pragmatic ontology, built with linguistic expertise from a editorial board
 - national content coordinators and forum; dealing with ISOcat legacy terms
 - guidelines and approval process for terms (add/change/expire)
 - community involvement with discussion and votes, although sustainability is challenging
- **Lesson learned => technology is usually not the main problem!**

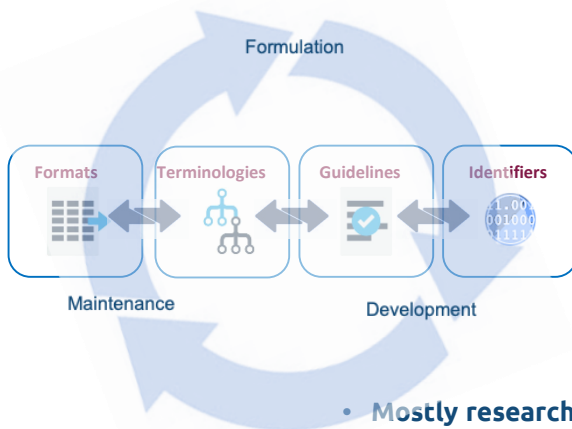
1. http://www.lrec-conf.org/proceedings/lrec2014/pdf/153_Paper.pdf
2. https://pure.knaw.nl/ws/portalfiles/portal/1686735/CAC_2015_CCR.pdf

Organizational differences - SDOs vs grass-roots

Standard organizations,



- Industry-level standards
- Mostly regulators-driven
- Participation is often regulated
- Standards are sold or licenced
- Formal development process, often less flexible, could be lengthy
- Charges apply to advanced training or programmatic access

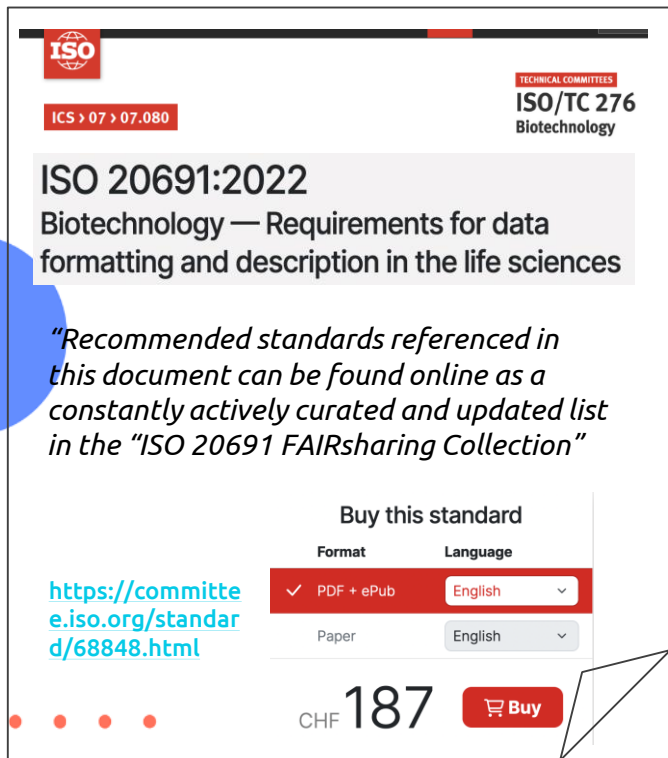


Grass-roots groups, e.g.:



- Mostly research-level standards
- Open to any interested party
- Volunteering efforts
- Standards are free for use
- Development process varies, more flexible and adaptable to changes
- Minimal or little funds for carry out the work, let alone provide training

Synergies opportunities - ISO & FAIRsharing example



ISO
TECHNICAL COMMITTEES
ISO/TC 276
Biotechnology

ICS > 07 > 07.080

ISO 20691:2022

Biotechnology — Requirements for data formatting and description in the life sciences

“Recommended standards referenced in this document can be found online as a constantly actively curated and updated list in the “ISO 20691 FAIRsharing Collection”

Buy this standard

Format	Language
<input checked="" type="checkbox"/> PDF + ePub	English
<input type="checkbox"/> Paper	English

<https://committee.e.iso.org/standard/68848.html>

CHF **187**

FAIRsharing.org



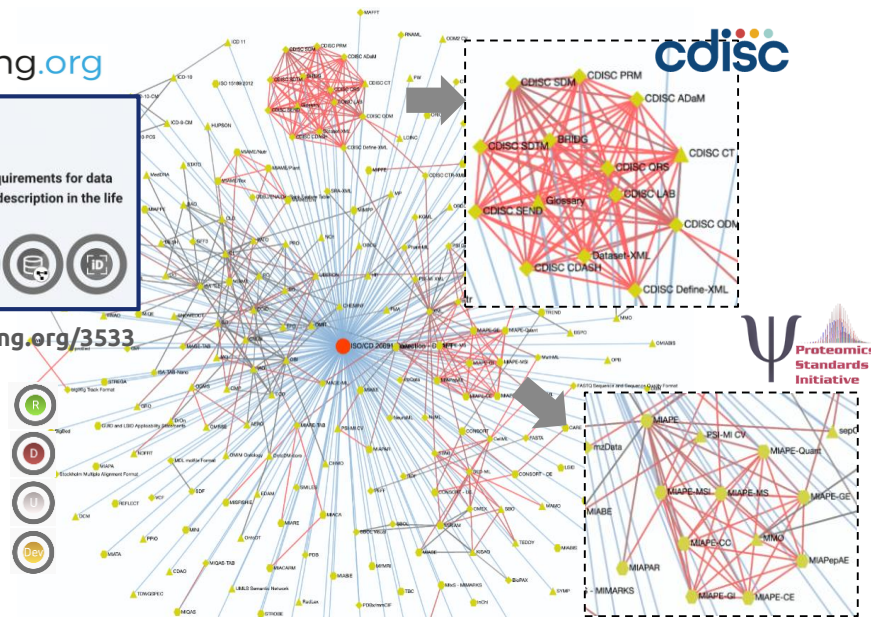
ISO ISO 20691 - Requirements for data formatting and description in the life sciences

Record Status: ready

<https://fairsharing.org/3533>

Record Status

ready
 deprecated
 uncertain
 In Development



- FAIRsharing holds a ‘live’ collection of the standards (incl. semantics artefacts) and their relationships, recommended by the ISO document.
- Complements the static (and non-machine readable) list of standards in the ISO spec!

Long standing issues and known pain-points

Technical and social challenges, incl.:

- **Governance and ownership**, especially when working across-sectors
- **Fragmentation, harmonization and extensions**
- **Indicators and evaluation methods**
- **Implementations, tools and services**
- **Credit and incentives for contributors**
- **Education, documentation and training**
- **Funding stream to support the 'life cycle' and uptake/adoption**
- **Business models for the sustainability of people/experts and related services**

Empowering industrial research with shared biomedical vocabularies

Lee Harland^{1,10}, Christopher Larminie², Susanna-Assunta Sansone³, Sorana Popa⁴, M. Scott Marshall⁵, Michael Braxenthaler⁶, Michael Cantor⁷, Wendy Filsell⁸, Mark J. Forster⁹, Enoch Huang¹⁰, Andreas Matern¹¹, Mark Musen¹², Jasmin Saric¹³, Ted Slater¹⁴, Jabe Wilson¹⁵, Nick Lynch¹⁶, John Wise¹⁷ and Ian Dix¹⁸

¹ Connected Discovery Ltd, 27 Old Gloucester Street, London WC1N 3AX, UK

² GlaxoSmithKline, Computational Biology, 2F157 Gunnels Wood Road, Stevenage, Hertfordshire SG1 2NY, UK

³ Standards and Data Sharing Infrastructure Team, e-Research Centre, University of Oxford, 7 Keble Rd, Oxford OX1 3QG, UK

⁴ Knowledge Management and Information Science, R&D Information, AstraZeneca R&D Mölndal, 431 83 Mölndal, Sweden

⁵ Department of Medical Statistics and Bioinformatics, Leiden University Medical Center, Einthovenweg 20, 2333 ZC Leiden, The Netherlands

⁶ Pharma Research and Early Development, Hoffmann-La Roche Inc., 340 Kingsland St, Nutley, NJ 07110, USA

⁷ Pfizer Worldwide Research and Development, 235 E 42nd St, MS 1505/60N, New York, NY 10017, USA

⁸ Unilever R&D, Colworth Science Park, Sharnbrook, Bedfordshire MK44 1LQ, UK

⁹ Syngenta R&D Information Systems, International Research Centre, Jealotts Hill, Berkshire RG42 6EX, UK

¹⁰ Pfizer Worldwide Research and Development, 35 Cambridge Park Drive, Cambridge, MA 02140, USA

¹¹ Thomson Reuters Life Sciences, 22 Thomson Place, Boston, MA 02210, USA

¹² Stanford University, Stanford University, 251 Campus Drive, Stanford, CA 94305-5470, USA

¹³ Scientific Information Centre, Boehringer Ingelheim Pharma GmbH & Co. KG, 88397 Biberach, Germany

¹⁴ Merck Sharp & Dohme Corp, 33 Avenue Louis Pasteur, Boston, MA 02115-5727, USA

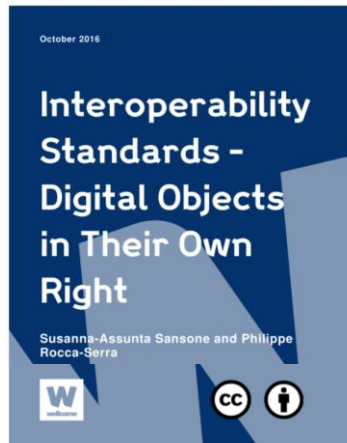
¹⁵ Science & Technology, Corporate Markets, Elsevier Pharma and Biotech Group, Elsevier, 32 Jamestown Road, London NW1 7BY, UK

¹⁶ AstraZeneca UK, Alderley Park, Macclesfield SK10 4TG, UK

¹⁷ The Pistola Alliance

Drug Discovery Today • Volume 16, Numbers 21/22 • November 2011

DOI: 10.1016/j.drudis.2011.09.013



DOI: 10.6084/m9.figshare.4055496.v1

Ongoing and planned activities - examples



Semantic Artefact Governance Workshop

16.30 - 18.30 CEST
28 Sept 2023
Lecce (Italy) & Online

Co-located with
OntoPortal
Workshop 2023

eosc | FAIR-IMPACT | FAIR-IMPACT.eu | Funded by the European Union

[https://fair-impact.eu/events/fair-impact-events/fair-impact-semantic-artefact-governance-workshop`](https://fair-impact.eu/events/fair-impact-events/fair-impact-semantic-artefact-governance-workshop)

Common Minimum Metadata for FAIR Semantic Artefacts

Clement Jonquet (1, 2), Biswanath Dutta (3), Luiz O. Bonino da Silva Santos (4, 5), Robert Pergl (6, 7), Yann Le Franc (7)

[Show details](#)

- 1 WEB3 - WEB Architecture x Semantic WEB x WEB of Data
 - 2 MISTEA - Mathématiques, Informatique et Statistique pour l'Environnement et l'Agronomie
 - 3 ISI - Indian Statistical Institute [Bangalore]
 - 4 University of Twente
 - 5 LUMC - Leiden University Medical Center
 - 6 CTU - Czech Technical University in Prague
 - 7 e-SDF - e-Science Data Factory [Paris]
- 

<https://hal.science/hal-04106533v2>

Standards and Semantic artefacts are pillars of FAIR and therefore addressed by all EOSC projects

eosc



Semantic artefacts key in the FAIR evaluation/assessment

eosc | FAIR Metrics and Data Quality Task Force

FAIR Assessment Tools: Towards an "Apples to Apples" Comparisons

Authorship Community:

Mark D Wilkinson^{1,2}, Susanna-Assunta Sansone^{2,4}, Marjan Grootveld^{2,5}, Josefine Nordling^{2,6}, Richard Dennis^{2,7}, David Hecker^{2,8} on behalf of the EOSC FAIR Metrics subgroup

1. BACKGROUND	
2. THE APPLES-TO-APPLES BENCHMARK ENVIRONMENTS	https://www.eosc.eu/sites/default/files/2023-01/Report%20on%20the%20FAIR%20Evaluation%20events_final_sub.pdf
3. CONCLUSIONS, SO FAR	
4. NEXT STEPS	
COMPLIANCE WITH METADATA STANDARDS	
BRINGING IN KEY STAKEHOLDERS	
SUSTAINABILITY	
REFERENCES	

FAIRsharing.org + + +



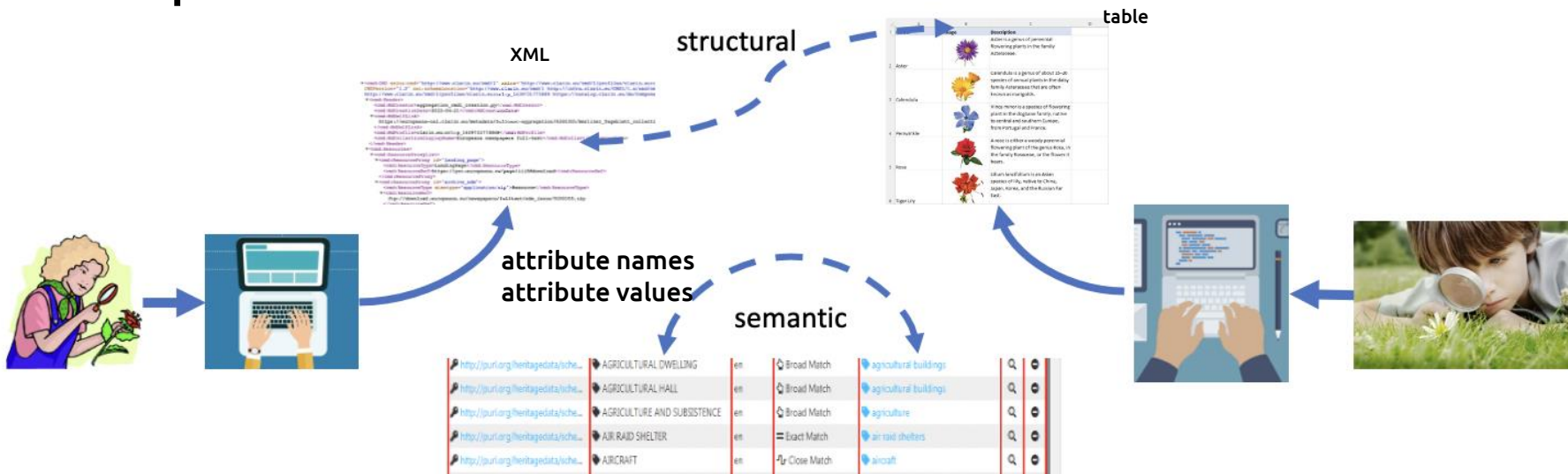
Mappings, crosswalks and alignment

Presented by Daan Broeder



Mapping different structures and semantics

Mappings relate the content of items in different data description schema meant for similar information.



semantic relation types: "equality (close) (exact)", "broader" and "narrower" ...

value scheme conversions: eg. date/time, coordinate system formats
unit conversions: eg. temperature in K vs C

Mapping examples

Entity 1	Entity 2
tectonic movement(ENVO:01001093)	Continental drift (SWEETPhenGeoTectonic:ContinentalDrift)
river bank (ENVO:00000143)	Riparian zone (SWEETRealmLandCoastal:RiparianZone)
marine benthic biome (ENVO:01000024)	Benthic zone (SWEETRealmOcean:BenthicZone)
leaf alternate placement(FLOPO:0001032)	Phyllotaxy (TO:0006014)
rhizome mass (FLOPO:0003190)	Rhizome dry weight (TO:0000556)
whole plant lifestyle (FLOPO:0980070)	Life cycle habit (TO:0002725)

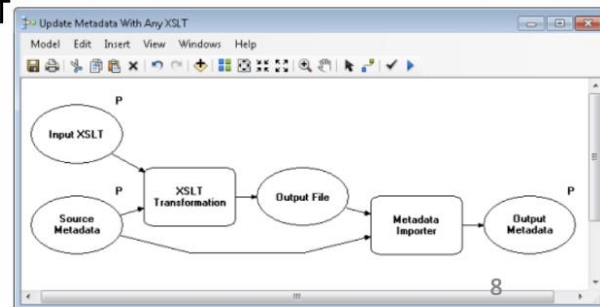
simple mapping example BioDiv / Earth System Sciences

Some communities use XML as a metadata format with hierarchical schema, which can introduce additional context for the entity semantics and their mappings

not easy to create conversions without using complex code

tables are powerful and can provide sufficient information (adding extra columns) for very detailed mapping descriptions

Often mapping specifications and conversion are combined in technologies such as XSLT



The use for mappings and crosswalks

Main purposes:

- aggregating and integrating data-sets for further processing
- retrieval of suitable records from heterogeneous sources

Crosswalks do not always need to be complete, just need to achieve their (project limited) purpose, many are 'experimental'

Note the difference between modelling and only specifying relations, and actually converting data, collecting all relevant mappings (crosswalk) and putting this in code

Mapping representations

Mappings can be represented or found in many formats

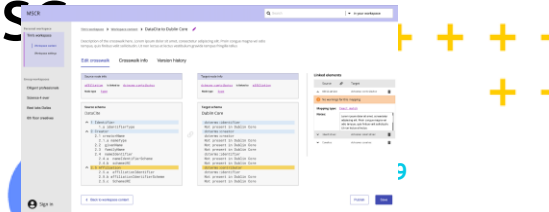
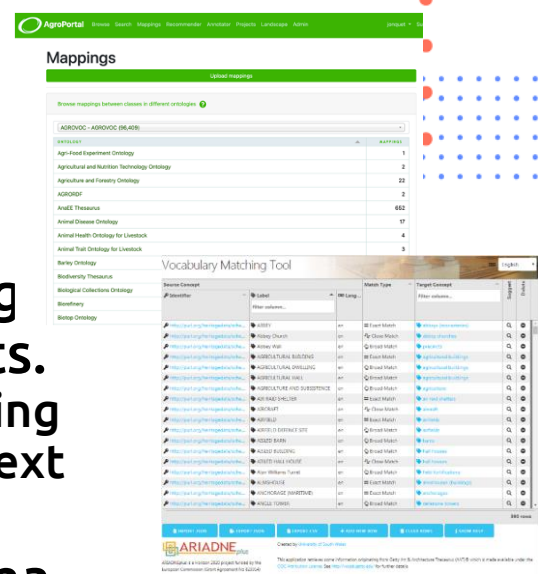
- Research papers, Tables, Code and XSLT, RDF/OWL
- Tables are still broadly mappings
- Source code and esp. XSLT also are heavily used

Mappings in non-RDF formats should not be ignored, improve their FAIRness by providing proper metadata, provenance and registration using PIDs

However proper modelling with agreed relation typology should be preferred for future work eg. using SSSOM

Tools for creating mappings and crosswalks

- Automatic, usually based on automatic string matching of the entities in semantic artefacts.
 - e.g. OntoPortal; challenges are the string matching to be domain specific fuzzy, and the lack of context
- Tools allowing experts to create relations between suitably visualised entities in schema & ontologies
- Good examples exist eg. Cocoda (libraries), VMT (Archeology/Cultural Heritage), DME (Humanities),
- New tool under construction, FAIRCORE4EOS project is working on MSCR



Current relevant EOSC project work



MSCR
EOSC Metadata Schema
& Crosswalk Registry

FAIRIMPACT:

See the references doc

FAIRCORE4EOSC:

- Creating the MSCR, a metadata schema crosswalk registry for all types of mappings including those embedded in texts, tables, code, ...
 - FAIR data management functions, ao: proper metadata, provenance and PIDs helping researchers to find, reuse and share crosswalks
 - A graphical mapping tool allowing users create crosswalks between different metadata schema
- Two community case-studies Climate and SSH testing out the MSCR
- Two demonstrators, general data management tools B2SHARE and B2FIND using the MSCR to manage metadata schema and mappings



Implementation examples: The Semantic Analyser

Alexandra Kokkinaki & Gwenaelle
Moncoiffe

The objective

- **Semantic interoperability** for multidisciplinary data from various sources
 - Earth & Environmental Dynamics
 - Environmental Bio-geochemistry
 - Biodiversity Observations
- **Discovery - Harmonisation**

Metadata records

Datasets

Low
granularity
level semantic
artefacts

High
granularity
level semantic
artefacts



Building Blocks

- **Crosswalks between metadata/data standards**
 - e.g. from ISO19139, DCAT etc TO ISO19115
- **Mappings between semantic artefacts (terms/instances)**
- **Avoid manual mappings when possible (tedious)**
 - Mapping frameworks e.g. I-ADOPT

Syntactic

Semantic

Mappings Crosswalks

Values

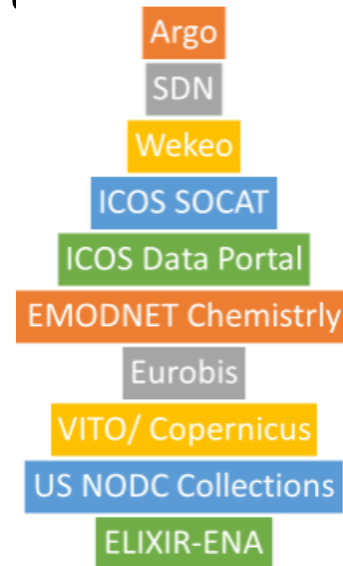
Strings that may/may not originate from a semantic network

oceans, geoscientificInformation, sea surface temperature, fCO2, Ship, satellite-observation,
Seas and coasts etc, marine biome (ENVO:00000447), 454 GS FLX Titanium,
Inorganic chemical composition of sediment or rocks

URIs: <http://vocab.nerc.ac.uk/collection/L05/current/60/> <http://www.seadatanet.org/urnurl/SDN:P02::RMIN/>

Codes: ENVO:00000447, SDN\L05\:\:60

Combination: deep chlorophyll maximum layer (ENVO:xxxxxxx)



The semantic analyser:

Focus on a set of metadata elements

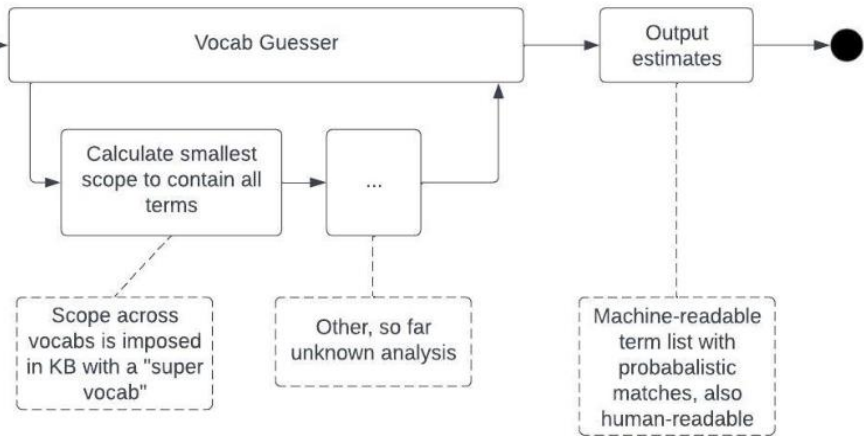
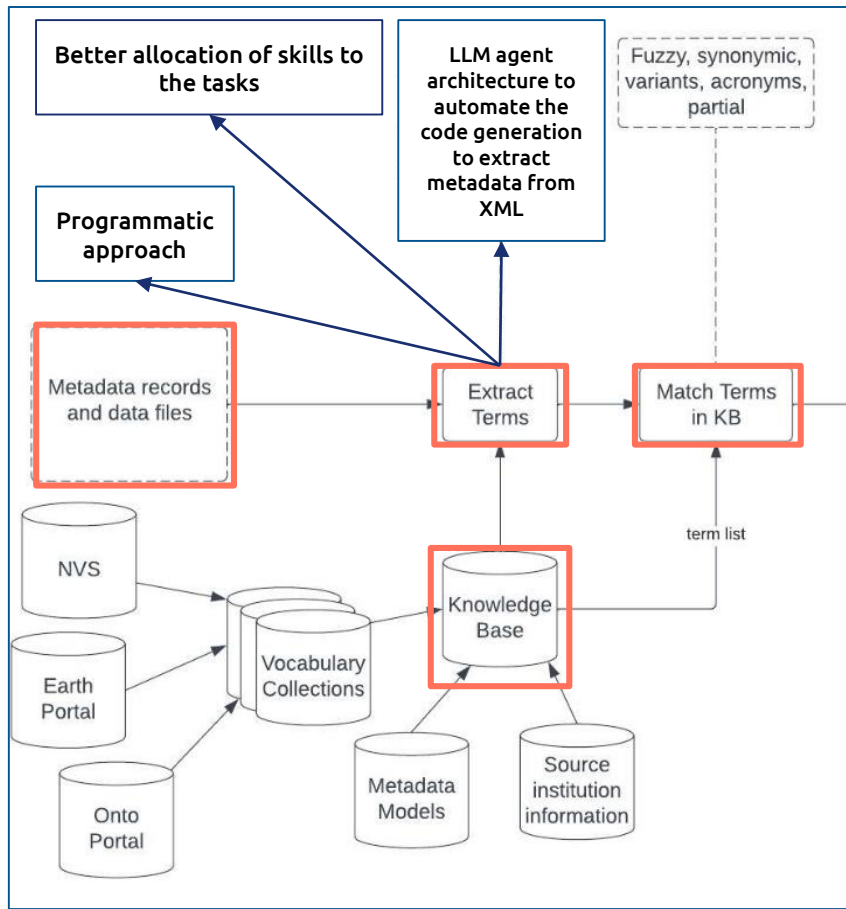
- Keywords
- Parameters
- Units
- Platforms
- Sensors

Semantic artefacts?

Analyse them to identify

```
<gmd:descriptiveKeywords>
  <gmd:MD_Keywords>
    <gmd:keyword>
      <gco:CharacterString>Biocenosis</gco:CharacterString>
    </gmd:keyword>
    <gmd:keyword>
      <gco:CharacterString>Eutrophication</gco:CharacterString>
    </gmd:keyword>
    <gmd:keyword>
      <gco:CharacterString>EUROBIS</gco:CharacterString>
    </gmd:keyword>
  </gmd:MD_Keywords>
</gmd:descriptiveKeywords>
```









Sources

- ELIXIR-ENA
- ICOS SOCAT
- ICOS Data Portal
- Copernicus Marine Environment Monitoring Service (CMEMS)

- SeaDataNet products
- EMODnet Chemistry

Results

-  8E494D045ED3115EEF5C6E697510408A52DA2039
SOCAT v2020 DSG Files
-  BBC7EF49B0FA24B73C286BB58999F8FC1B34DC0
XUE08_064-104
SOCAT v2020 DSG Files
-  41C44BA3E831654BCCA93CFF1ADA2FC17D0CEC
SOCAT v2020 DSG Files
-  sdn-open:urn:SDN:CDI:LOCAL:5060-5060-5060-ds0
SeaDataNet - Marine geology from Institute for Marine and Coastal Sciences
SeaDataNet is the pan-European infrastructure

Analyser

Analyser Endpoint

Threshold

Enter URI

1



The semantic analyzer

Sources

SELECT ALL

- ELIXIR-ENA
- ICOS SOCAT
- ICOS Data Portal
- Copernicus Marine Environment Monitoring Service (CMEMS)
- SeaDataNet products
- EMODnet Chemistry

SEARCH

1 files selected:

- SeaDataNet - Biological oceanography from CNR, Natio... (82237 bytes)

Analyser

Analyser Endpoint

https://99koor0nmj.execute-api.ap-southeast-2.amazonaws.com/production/process_metadata

Threshold

1


ANALYSE METADATA


Analyser output


SeaDataNet - Biological oceanography from CNR, National Research Council, Institute of Marine Science (Ancona) (PointOfContact; Data Custodian; Data Distributor), point observations

Method	MatchURI	MatchProperty	MatchTerm	SearchTerm
Instrument - Exact Match	http://vocab.nerc.ac.uk/collection/L05/current/351/	preferred label	SDN:L05:351	SDN\L05\351
Instrument - Exact Match	http://vocab.nerc.ac.uk/collection/L05/current/30/	preferred label	SDN:L05:30	SDN\L05\30
Instrument - Exact Match	http://vocab.nerc.ac.uk/collection/L05/current/113/	preferred label	SDN:L05:113	SDN\L05\113
Instrument - Exact Match	http://vocab.nerc.ac.uk/collection/L05/current/23/	preferred label	SDN:L05:23	SDN\L05\23
Instrument - Exact Match	http://vocab.nerc.ac.uk/collection/L05/current/90/	preferred label	SDN:L05:90	SDN\L05\90
Instrument - Exact Match (Identifiers)	http://vocab.nerc.ac.uk/collection/L05/current/130/	preferred label	SDN:L05:130	SDN\L05\130
Instrument - Exact Match (Identifiers)	http://vocab.nerc.ac.uk/collection/L05/current/351/	preferred label	SDN:L05:351	SDN\L05\351
Instrument - Exact Match (Identifiers)	http://vocab.nerc.ac.uk/collection/L05/current/30/	preferred label	SDN:L05:30	SDN\L05\30
Instrument - Exact Match (Identifiers)	http://vocab.nerc.ac.uk/collection/L05/current/113/	preferred label	SDN:L05:113	SDN\L05\113
Instrument - Exact Match (Identifiers)	http://vocab.nerc.ac.uk/collection/L05/current/23/	preferred label	SDN:L05:23	SDN\L05\23
Instrument - Exact Match (Identifiers)	http://vocab.nerc.ac.uk/collection/L05/current/90/	preferred label	SDN:L05:90	SDN\L05\90
Variable - Exact Match	http://vocab.nerc.ac.uk/collection/P03/current/D032/	preferred label	Sea level	sea level
Variable - Exact Match	https://gcmd.earthdata.nasa.gov/kms/concept/9ac7a1c5-4179-47bc-8589-ebaa90d6cbd1	preferred label	SEA LEVEL	sea level


Results (973)


 sdn-open:um:SDN:CDI:LOCAL:1809-1809-1809-ds04-4
SeaDataNet - Marine geology from Geological Survey
 SeaDataNet is the Pan-European infrastructure for marine and ocean data management and delivery serv...

 sdn-open:um:SDN:CDI:LOCAL:1022-1426-1022-ds04-4
SeaDataNet - Marine geology from French Geological Survey
 SeaDataNet is the Pan-European infrastructure for marine and ocean data management and delivery serv...

 sdn-open:um:SDN:CDI:LOCAL:1022-485-1022-ds12-4
SeaDataNet - Human activities from French Geological Survey
 SeaDataNet is the Pan-European infrastructure for marine and ocean data management and delivery serv...

 sdn-open:um:SDN:CDI:LOCAL:1022-1926-1022-ds06-4
SeaDataNet - Terrestrial from French Geological Survey
 SeaDataNet is the Pan-European infrastructure for marine and ocean data management and delivery serv...

 sdn-open:um:SDN:CDI:LOCAL:96-1570-96-ds03-4
SeaDataNet - Physical oceanography from German Oceanographic Museum
 SeaDataNet is the Pan-European infrastructure for marine and ocean data management and delivery serv...

 sdn-open:um:SDN:CDI:LOCAL:120-4751-120-ds12-4
SeaDataNet - Human activities from National Institute for Research in Diving

The Knowledge Base

SPARQL Query

To try out some SPARQL queries against the selected dataset, enter your query here.

Example Queries

[Selection of triples](#) [Selection of classes](#)

Prefixes

[rdf](#) [rdfs](#) [owl](#) [xsd](#)

SPARQL Endpoint

Content Type (SELECT)

Content Type (GRAPH)

/fair-ease/sparql

JSON

Turtle

```
1 select (?a as ?SemanticArtefact) ?Graph where
2 {
3   {graph ?Graph {?a a <http://www.w3.org/2004/02/skos/core#ConceptScheme> .}}
4
5   union {graph ?Graph {?a a <http://www.w3.org/2002/07/owl#Ontology> .}} union {graph ?Graph {?a a <http://www.w3.org/2004/02/skos/core#Collection> .}}
6 }
7
```

<https://w3id.org/ozcar-theia>
<http://inspire.ec.europa.eu/theme>
<https://w3id.org/ozcar-theia/>
<http://purl.obolibrary.org/obo/envo.owl>
<http://www.w3.org/ns/sosa/>
<http://www.w3.org/ns/sosa/>
<http://www.w3.org/ns/ssn/>
<http://www.w3.org/ns/ssn/>
<http://qudt.org/2.1/vocab/unit>
<http://www.w3.org/1999/02/22-rdf-syntax-ns#>
<http://www.w3.org/2000/01/rdf-schema#>
<http://www.w3.org/ns/prov-o#>
<http://www.w3.org/2002/07/owl>
<http://www.w3.org/2004/02/skos/core>
<http://purl.org/voc/cpm>
<https://w3id.org/iadopt/ont>
<https://w3id.org/iadopt/ont>
<http://www.w3.org/ns/prov#>
<http://qudt.org/2.1/vocab/quantitykind>
<http://www.w3.org/ns/dcat>
<https://w3id.org/ozcar-theia/variableCategoriesGroup>
<https://w3id.org/ozcar-theia/variableGroup>
https://w3id.org/ozcar-theia/skosCollection_a415bff4
https://w3id.org/ozcar-theia/skosCollection_58254f70
https://w3id.org/ozcar-theia/skosCollection_65cf7fa2
https://w3id.org/ozcar-theia/skosCollection_7198f400
https://w3id.org/ozcar-theia/skosCollection_ba31712c
<http://vocab.nerc.ac.uk/collection/>

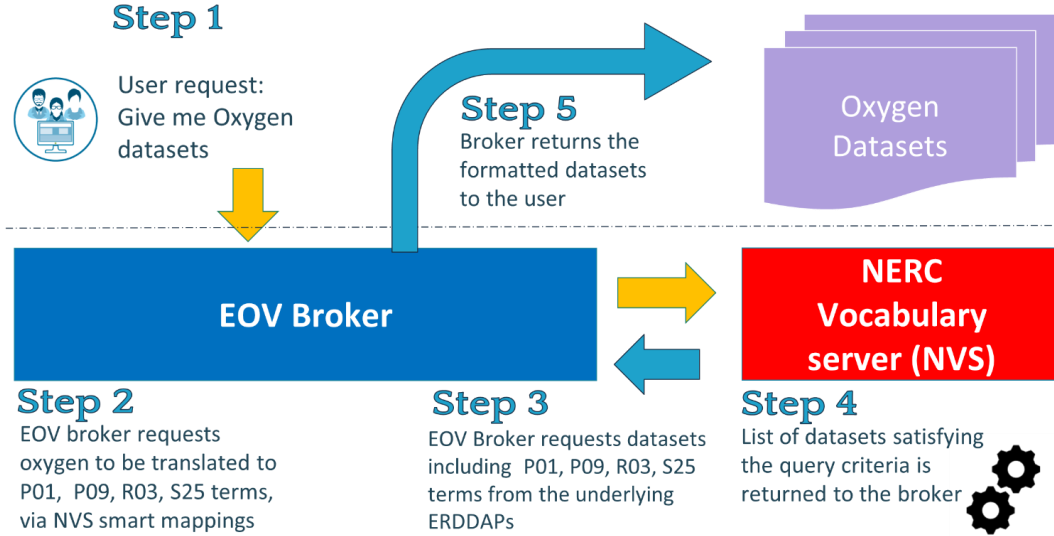
Next steps for the semantic analyser (SA)

- Enhance the KB with more semantic resources as we learn more about the data
- Finalise the LLM algorithm to automatically identify diverse XML snippets
- Enhance the SA input with datasets
- Implement the vocab guesser to provide mapping suggestions

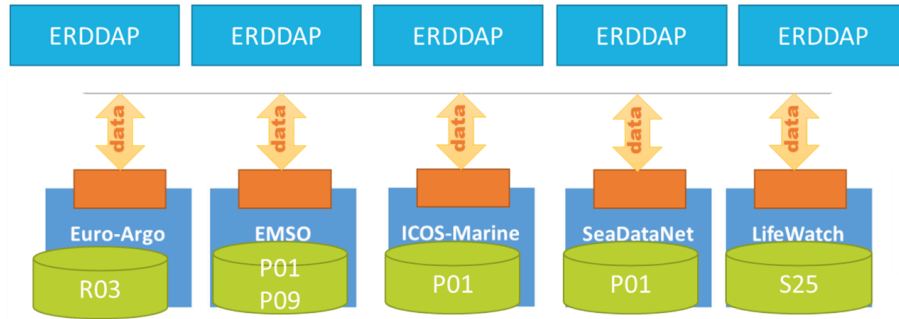


The EOV demonstrator - parameter harmonisation

i-adopt
Smart mappings



Find all the datasets that observe what is defined to be EOV oxygen



Conclusions

Complying to a standard does not achieve interoperability:

- Community agreements are essential

Semantic resources need standardised referencing from metadata/data records

- see [definedTerm](#)

Semantic mappings are a way to provide harmonisation but they are tedious:

Frameworks like **iadopt** can provide:

- Automated mappings
- Sliding up and down the granularity scale



Next up

EOSC contribution to Research Assessment

Barcelona | 12.10 - 13.10



Stay tuned

symposium23.eoscfuture.eu