

OntoCommons and FAIR principles

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OntoCommons project

Overcoming interoperability bottlenecks
&
facilitating data sharing and valorisation

OntoCommons Objectives

• **OBJ 1 – Community Development**

- CSA project ☐ cooperation establishment & engagement in providing input
- Increasing the effectiveness of *OntoCommons* (Cooperation)
- Two-way communication *OntoCommons* ↔ stakeholders (Engagement)

• **OBJ 2 – Ontology Commons EcoSystem**

- As a foundation for data documentation
- EcoSystem requirements and specifications
- Set of ontologies as a part of the EcoSystem
- EcoSystem tools

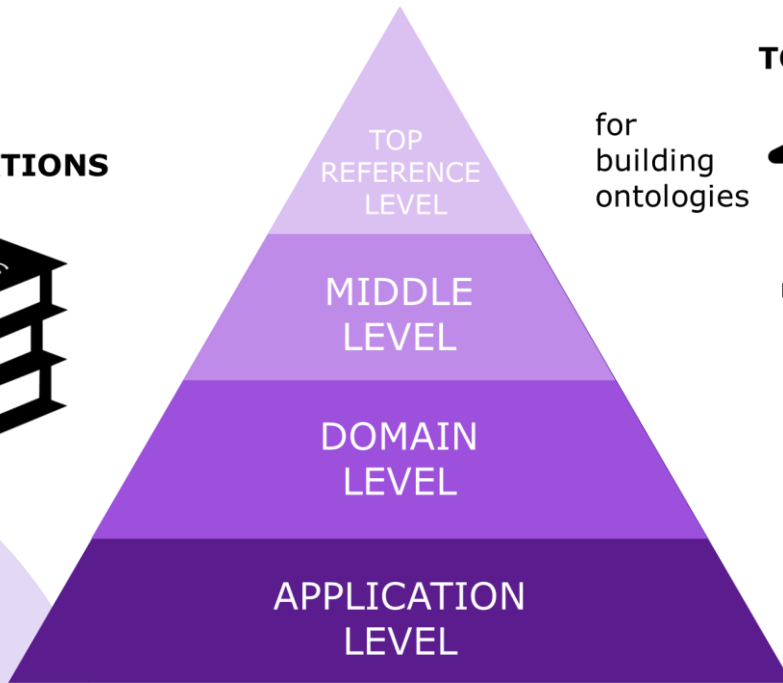


• **OBJ 3 – Demonstrators**

- Will prove the effectiveness of *OntoCommons EcoSystem*
- Ready to use ontologies, tools and data samples (dissemination purposes)
- Relying on existing or external resources

Ontology Commons EcoSystem

SPECIFICATIONS



ONTOLOGIES

TOOLS

for
building
ontologies



for data
documentation



Main project features

CONSORTIUM

- 19 Partners from 10 EU countries
- 15 RTDs and 4 companies

 **Trust-IT Services**
Communicating ICT to markets



 **e-science data**
FACTORY



UiO : University of Oslo

 **IRES**
Innovation in Research & Engineering Solutions

 **GOLDBECK**
CONSULTING



POLITÉCNICA



National Research Council of Italy



**Science and
Technology
Facilities Council**



**OÉ Gaillimh
NUI Galway**

IK4  **TEKNIKER**
Research Alliance

 **universität
innsbruck**
Department of
Computer Science

 **ATB** Institut für angewandte
Systemtechnik Bremen
GmbH



FAIR principles in OntoCommons

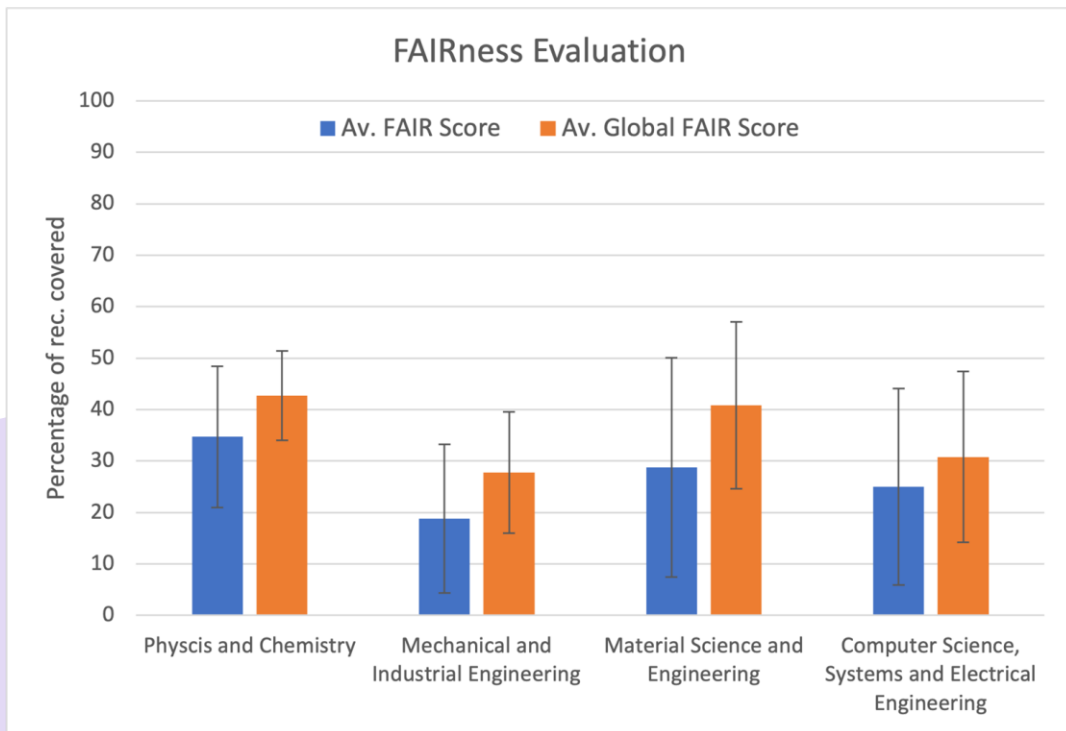
Assessing FAIRness of domain-specific semantic artefacts

- Landscape Analysis of semantic artefacts for Material Science and Manufacturing
- Corpus:
 - 108 ontologies identified (including ontologies from demonstrators)
 - 74 in a machine readable format
- Semantic Artefacts must be FAIR (principle I2)
- How FAIR are these ontologies? How can we improve the situation?

Assessing FAIRness of domain-specific semantic artefacts

- Used FAIR Semantics recommendations from FAIRsFAIR - [doi: 10.5281/zenodo.5362010](https://doi.org/10.5281/zenodo.5362010)
- 17 recommendations: 9 mandatory, 6 recommended, 2 Optional
- Established 13 questions to evaluate FAIRness based on the 9 relevant recommendations for ontologies
- Evaluated manually 44 ontologies and attributed two scores:
 - FAIR Score: % of mandatory recommendations covered
 - Global FAIR Score: % of recommendation covered (including recommended and optional)

Assessing FAIRness of domain-specific semantic artefacts



Next steps

- Compare our evaluation system with existing systems (AgroPortal, FooPS, F-uji, ...)
- Automate evaluation

Goal for OntoCommons Demonstrators Work

We aim to **define requirements for demonstration cases** to deliver demonstrators for different applications of ontology based data documentation and interoperability.

We aim at a **validated set of cases of industrial importance** demonstrating the expected impact of *OntoCommons* standardisation, operational, FAIR, practicality, user-friendliness, cross-domain nature, uptake of project results and software interoperability.

What we do with OntoCommons Demonstrators?

05.1	Collect and analyse requirements from 11 initial use cases
05.2	Specify the initial 11 cases in more detail
05.3	Outline, select and specify in detail further more “ambitious” use cases
05.4	Manage the process of stakeholder and partner involvement in demonstration activities
05.5	Develop test and validate the industrial use cases and provide feedback
05.6	Facilitate agreement on the industrial use cases by wider stakeholder involvement
05.7	Support networking of industrial cases and wider stakeholders

11 initial demonstrators

N.	Name	Case Description	Domains	TRL	Project Partners (and 3rd Parties)
1	IRIS - IndustRIal co- design Support	Assembly plant facility design process, logistics flow and logistic resource design.	Aerospace, Manufacturing	TRL start: 4 TRL end: 6	UIO (Airbus)
2	SeDIM - Semantic Data Integration for Manufacturing	Microchip manufacturing. Enable integration of heterogeneous factory-wide data for analytics of factory machines, processes and their monitoring and control.	Manufacturing, Resources, Process plants, Industrial Facilities	TRL start: 3 TRL end: 4	BOSCH

3	EngDemostrator	Comparison of industry standard material grades as listed in EN, ISO or ASTM standards through an ontology based reasoning engine.	Production industry, Material technology	TRL start: 4 TRL end: 6	(Aibel)
4	Tribomat	The use case will shorten the time and the number/size of experiments required to identify the behaviour of a material or combination of them (e.g. metal, coating, lubricant) with respect to specific operation conditions.	Manufacturing – at various sectors (e.g. Automotive, Aerospace, Energy, ...) Processing Materials characterization	TRL start: 3-4 TRL end: 6-7	TEK
5	EVMF - European Virtual Marketplace Framework	Facilitate platforms interoperability and services within an open European Virtual Marketplace Framework, involving tools and ontologies from the Allotrope Framework and NMBP materials modelling marketplace projects	Materials, Nanotechnologies, Biotechnology, Manufacturing and Processing	TRL start: 4 TRL end: 6-7	UKRI, GCL
6	PSS - Product Service Systems	Improve effectiveness and responsiveness of decision-making in logistics control systems based on data sharing built around big volume data streams semantically described by dedicated PSS ontologies	Equipment industry, Manufacturing	TRL start: 4-5 TRL end: 6	ATB (OAS)

7	Feedstock Quality Assurance	Evaluation and quality assurance of feedstock for further processing through: measurement of different feedstocks, correlation with other feedstocks quality and correlation with quality of produced components	Materials, Materials Processing, Quality Control, Materials Characterisation	TRL start: 3 TRL end: 5-6	FRAUNHOFER
8	NanoMaterials Characterisation	<ul style="list-style-type: none"> - Nanomaterial risk assessment, evaluation of risk control efficiency and decision making. - Phase identification in multiphase materials for nanoindentation process 	Nanosafety, Nanocomposites, Characterisation, Materials Design	TRL start: 4 TRL end: 6	IRES
9	Ontology-based Maintenance	Standardize the terminology of the maintenance process, focusing in particular on the diagnosis of technical malfunctioning, and leveraging on knowledge extracted from service information flows and repair records	Equipment Industry, Maintenance of Large Manufacturing Machines	TRL start: 3-4 TRL end: 5-6	CNR (Adige SpA)
10	Cu/Al Data	Enable effective data documentation and cross domain data reuse in the copper and aluminum industry	Materials Characterization	TRL start: 4 TRL end: 6	UIO (ElvalHalcor)
11	Complex Equipments	Describing and analysing the digital twin of products/industrial assets in manufacturing and energy industry across their lifecycle from design to service based on IT systems	Factories of the Future, Manufacturing	TRL start: 4 TRL end: 6	UIO (Siemens)

WP Progress and Activities

1st demonstrator workshop, interviews and surveys took place

Key findings

- Many of the targeted domains well-represented, with the exception of biotechnology
- Certain requirements are particularly prominent (valid for more than half of the demonstrators)
 - Conformance to standards (e.g., industry, ISO, W3C standards)
 - Interoperability between top level ontologies
 - Easy maintenance of ontologies by non-ontology experts
 - Tools to support collaborative development of ontologies
 - There is room for improvement in terms FAIRness

Call for new demonstrators

- Approximately 20 more external/EU projects demonstrators will be added to OntoCommons, by autumn 2021 – watch out for the open call!
- Advantages of being an OntoCommons demonstrator
 - Getting access to a group of experts in semantic technologies, particularly ontology development
 - Network with other companies in your domain
 - Participation in project workshops and visibility gain
 - Increase the Technology Readiness Level (TRL) of your use case
 - Have an impact on the OntoCommons roadmap in NMBP domains
 - **Access to guidelines and advices for improving the FAIR compliance of your data and metadata**
 - **Engage with the work of various standardization bodies**

FAIR Survey

- One of the main expected impacts of the OntoCommons project is to improve the “FAIRness” of demonstrator use cases
- In order to measure whether such an impact created, we conducted a survey to establish a baseline in terms FAIR-compliance
- The survey was filled by 11 initial demonstrators

- The questions in the survey were adopted from the RDA FAIR Data Maturity Model guidelines
 - 42 indicators in 4 dimensions

https://www.rd-alliance.org/system/files/FAIR%20Data%20Maturity%20Model_%20specification%20and%20guidelines_v1.00.pdf

4.1 List of indicators

Table 1 FAIR data maturity model indicators

FAIR	ID	Indicator	Priority
F1	RDA-F1-01M	Metadata is identified by a persistent identifier	●●● Essential
F1	RDA-F1-01D	Data is identified by a persistent identifier	●●● Essential
F1	RDA-F1-02M	Metadata is identified by a globally unique identifier	●●● Essential
F1	RDA-F1-02D	Data is identified by a globally unique identifier	●●● Essential
F2	RDA-F2-01M	Rich metadata is provided to allow discovery	●●● Essential
F3	RDA-F3-01M	Metadata includes the identifier for the data	●●● Essential
F4	RDA-F4-01M	Metadata is offered in such a way that it can be harvested and indexed	●●● Essential
A1	RDA-A1-01M	Metadata contains information to enable the user to get access to the data	●● Important
A1	RDA-A1-02M	Metadata can be accessed manually (i.e. with human intervention)	●●● Essential
A1	RDA-A1-02D	Data can be accessed manually (i.e. with human intervention)	●●● Essential
A1	RDA-A1-03M	Metadata identifier resolves to a metadata record	●●● Essential
A1	RDA-A1-03D	Data identifier resolves to a digital object	●●● Essential
A1	RDA-A1-04M	Metadata is accessed through standardised protocol	●●● Essential
A1	RDA-A1-04D	Data is accessible through standardised protocol	●●● Essential
A1	RDA-A1-05D	Data can be accessed automatically (i.e. by a computer program)	●● Important
A1.1	RDA-A1.1-01M	Metadata is accessible through a free access protocol	●●● Essential
A1.1	RDA-A1.1-01D	Data is accessible through a free access protocol	●● Important
A1.2	RDA-A1.2-01D	Data is accessible through an access protocol that supports authentication and authorisation	● Useful
A2	RDA-A2-01M	Metadata is guaranteed to remain available after data is no longer available	●●● Essential
I1	RDA-I1-01M	Metadata uses knowledge representation expressed in standardised format	●● Important
I1	RDA-I1-01D	Data uses knowledge representation expressed in standardised format	●● Important
I1	RDA-I1-02M	Metadata uses machine-understandable knowledge representation	●● Important
I1	RDA-I1-02D	Data uses machine-understandable knowledge representation	●● Important
I2	RDA-I2-01M	Metadata uses FAIR-compliant vocabularies	●● Important
I2	RDA-I2-01D	Data uses FAIR-compliant vocabularies	● Useful
I3	RDA-I3-01M	Metadata includes references to other metadata	●● Important
I3	RDA-I3-01D	Data includes references to other data	● Useful
I3	RDA-I3-02M	Metadata includes references to other data	● Useful

FAIR Survey

Disclaimer

The European Commission is not responsible for the content of questionnaires created using the form creator and manager. The use of EUSurvey service does not imply a recommendation or expressed within them.

Pages

[Introduction](#)[Demonstrator Information](#)[Findable](#)[Accessible](#)

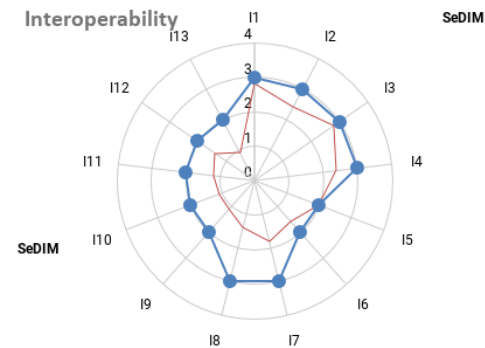
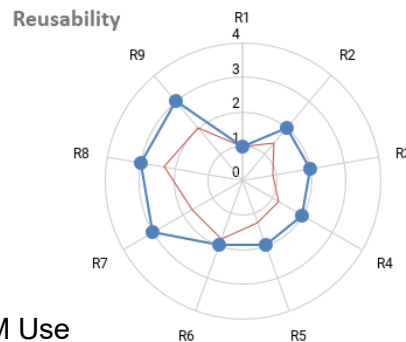
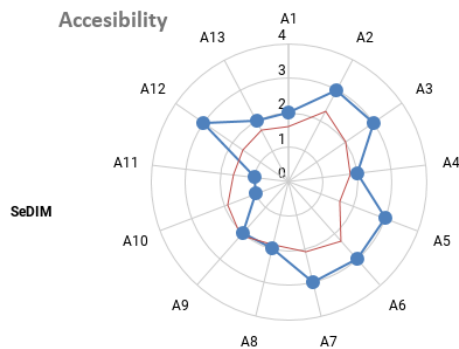
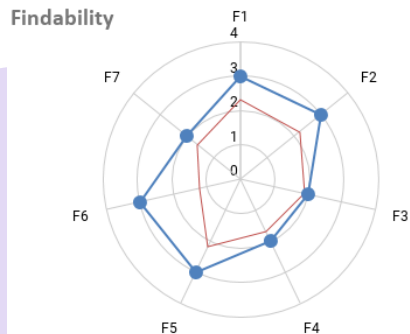
- We measured the current FAIR progress in the following scale:
 - 0 - not applicable
 - 1- not being considered yet
 - 2 - under consideration or in planning phase
 - 3 - in implementation phase
 - 4 - fully implemented

<https://ec.europa.eu/eusurvey/runner/b64d2bc9-28da-3347-332b-0dc6970789d3>

C Findable

- C.1 Metadata is identified by a persistent identifier ⓘ
 - ☐ not applicable
 - ☐ not being considered yet
 - ☐ under consideration or in planning phase
 - ☐ in implementation phase
 - ☐ fully implemented
- C.2 Data is identified by a persistent identifier ⓘ
 - ☐ not applicable
 - ☐ not being considered yet
 - ☐ under consideration or in planning phase
 - ☐ in implementation phase
 - ☐ fully implemented
- C.3 Metadata is identified by a globally unique identifier ⓘ
 - ☐ not applicable
 - ☐ not being considered yet
 - ☐ under consideration or in planning phase
 - ☐ in implementation phase
 - ☐ fully implemented
- C.4 Data is identified by a globally unique identifier ⓘ
 - ☐ not applicable
 - ☐ not being considered yet
 - ☐ under consideration or in planning phase
 - ☐ in implementation phase
 - ☐ fully implemented

- We used radar charts for each demonstrator to depict their current FAIR compliance



Example Analysis: SeDIM Use Case

- Initial analysis of 11 use cases have been completed
- From FAIRness point of view, there is still room for improvement
- Fortunately, a majority of the demonstrators are willing to implement the majority of FAIR principles
- The analysis we have done can guide, for instance, WP3 and WP4 to identify the most important features for ontologies and tools to foster higher adoption of FAIR principles

Join us as a demonstrator by September 30!



The Call to become
the new OntoCommons
demonstrator is open!

Apply now!



<https://ontocommons.eu/news-events/news/call-become-new-ontocommons-demonstrators>