ONTO COMMONS
ONTOLOGY-DRIVEN DATA DOCUMENTATION FOR INDUSTRY COMMONS

OntoCommons Project

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OntoComm ons “Ontology-driven data documentation for Industry Commons” has received funding from the European Union’s Horizon Programme call H2020 -NMBP-TO-IND-2020-singlestage, Grant Agreement number 958371

OntoCommons Overview

- **Overarching Goal**

  overcoming interoperatibility bottlenecks & facilitating data sharing and valorisation

- **Coordination and Support Action** -CSA

  bringing together and coordinating activities of the most relevant EU and international stakeholders

- **Development of an Ontology Commons EcoSystem -**OCES

  as a foundation for data documentation

Main project features

CONSORTIUM

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

TIMELINE

- Project Start: November 1st, 2020
- Duration: 36 months

OntoCommons Objectives

OBJ 1 – Community Development

- CSA project → cooperation establishment & engagement in providing input
- increasing the effectiveness of *OntoCommons* (Coorperation)
- two-way communication *OntoCommons* ↔ stakeholders (Engagement)

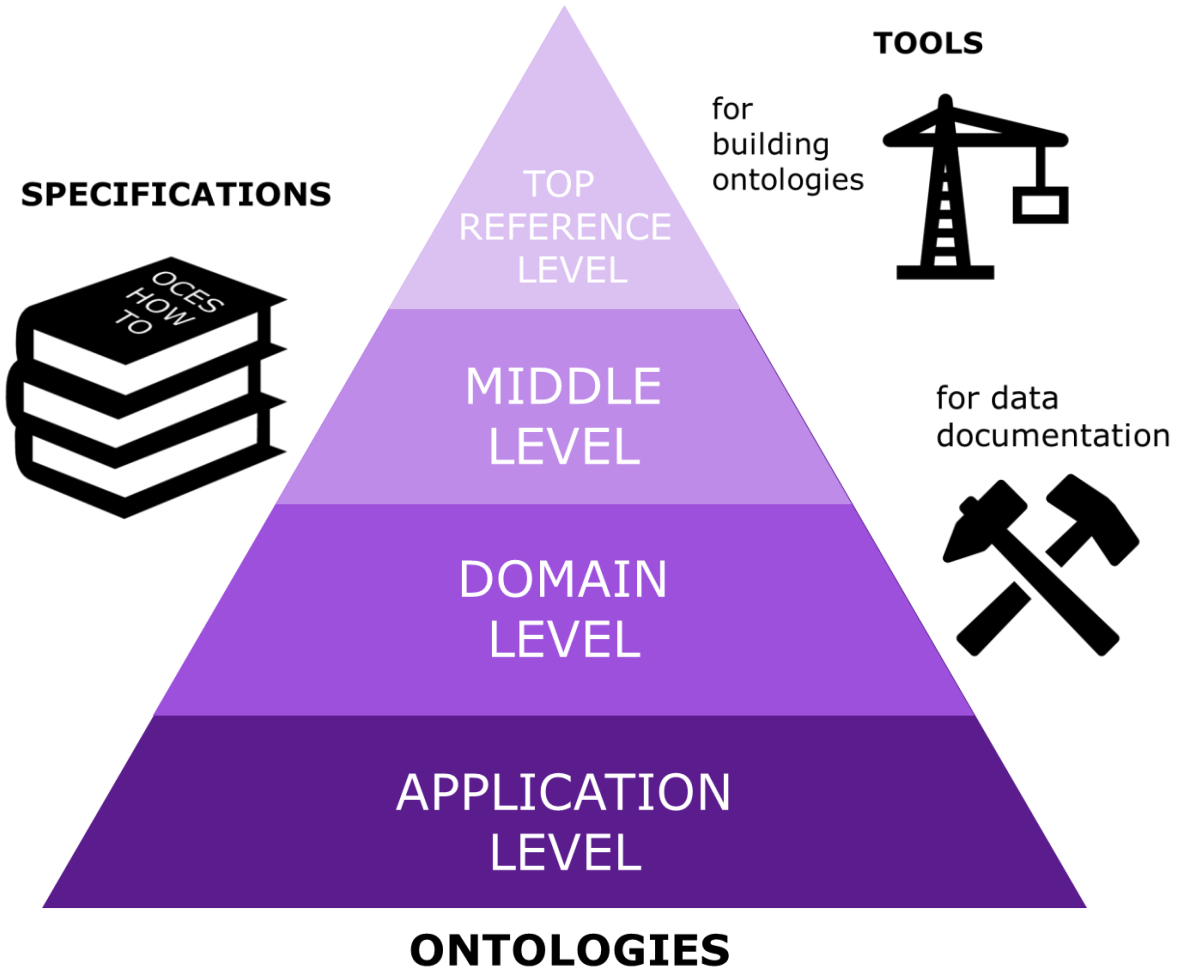
OBJ 2 – Ontology Commons EcoSystem

- EcoSystem Requirements and Specifications
- Top Level Ontologies (TLO) made of a mutual sets of alignments
- Middle Level Ontologies (MLO) to allow smooth connections between TLOs, lower level ontologies and commonly needed entities
- Domain Level Ontologies (DLO) needed by demonstators
- Tools

OBJ 3 – Demonstrators

- effectiveness of *OntoCommons* proved by demonstration cases (OCES)
- ready to use ontologies, tools and data samples (dissemination purposes)
- relying on existing or external resources

Ontology Commons EcoSystem



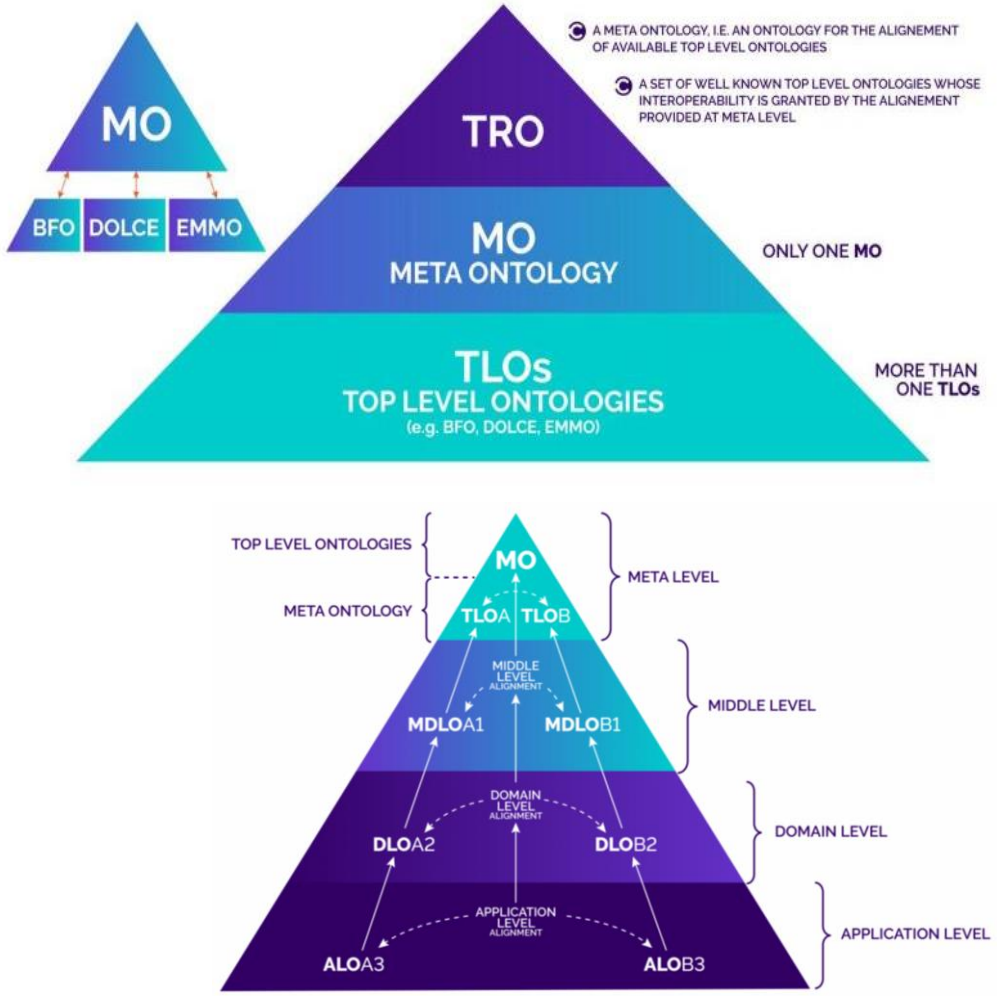
The OES will consist of:

a) a **hierarchy of networked ontologies** of different levels of generality (from top-level to application level) for which multiple forms of interoperability will be provided.

b) a **set of tools and methodologies** covering the full range of *OntoCommons* activities, from ontology development (e.g. editors) to reasoning (e.g. reasons) and database integration.

c) a **set of specifications** for ontologies that will provide full compatibility between tools and ontologies.

Ontologies harmonisation

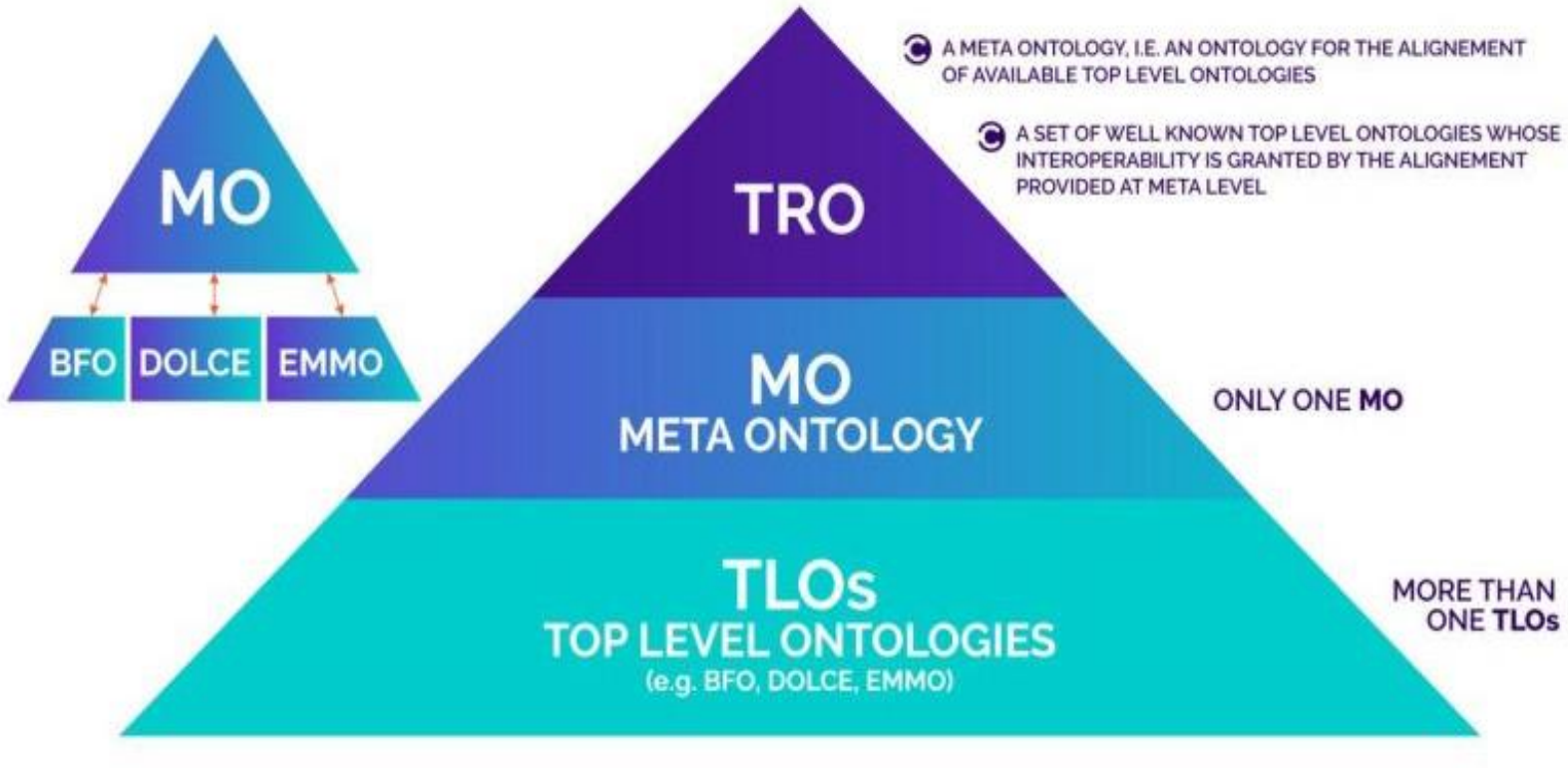


OntoCommons will provide harmonisation between ontologies, through Top Reference Ontology through a multilevel alignement:

- ***Syntactic*** alignment (OWL, FOL, etc.) for all the ontologies that will be part of the OES.
- **Terminological** alignment enabling a minimum taxonomical interoperability between ontologies, by pasting a sub-branch of one ontology under another ontology.
- **Semantic** alignment will be targeted primarily by OntoCommons only within TLO branches,.
- **Formatting** alignment including e.g. labelling of classes, the definition of terms and the annotations.

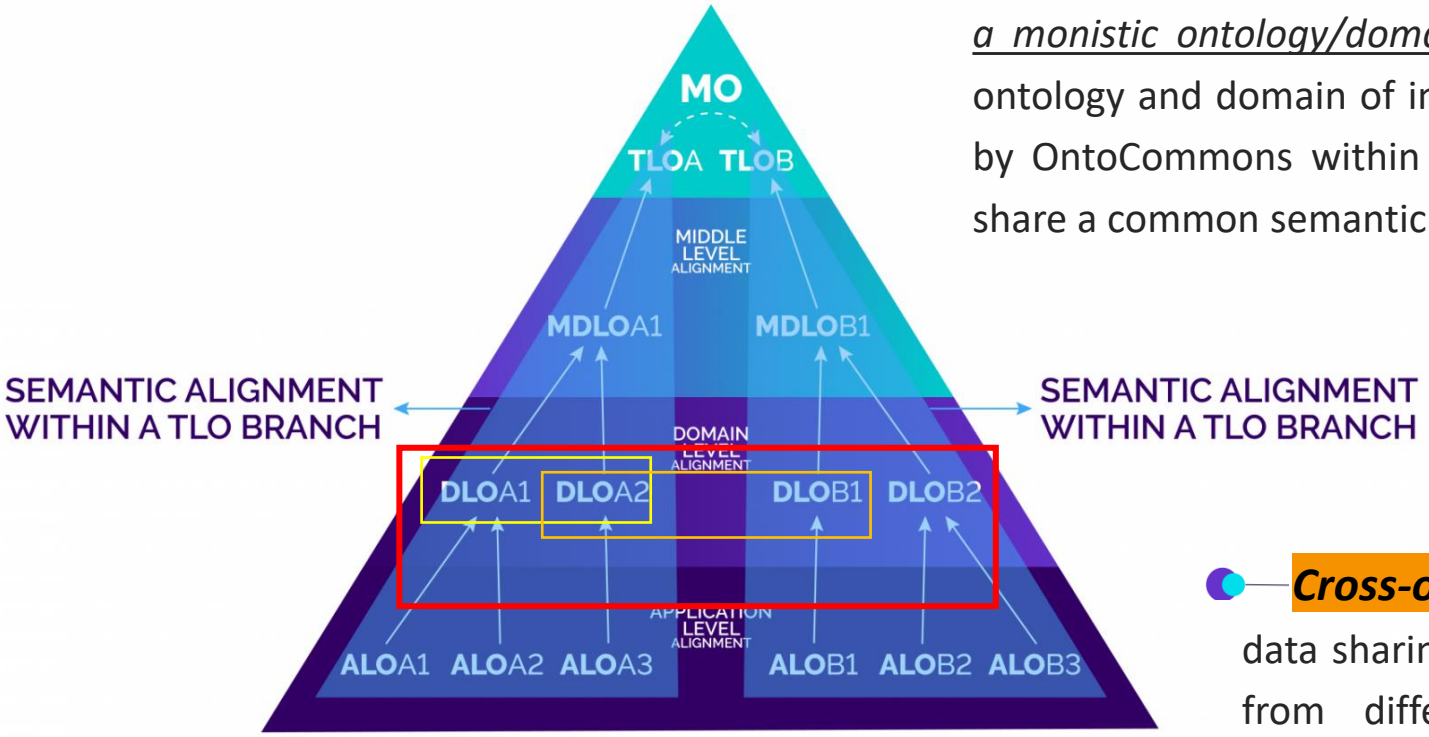
The OCES will adopt a pluralist approach for the ontological representation of a domain of interest, meaning that more than one ontology for the same domain may be hosted.

OntoCommons Top Reference Ontology



- The TRO will enable a common foundation for data interoperability between TLOs and lower level ontologies.
- The TRO will consist of
  - a **Meta Ontology (MO)** and
  - **a set of selected TLOs** (i.e. BFO, DOLCE, EMMO).
- The **Meta Ontology (MO)** will be developed by *OntoCommons* and will be the **foundation for comparison and interoperability between available state of the art TLOs.**

Intra and Cross-ontology interoperability

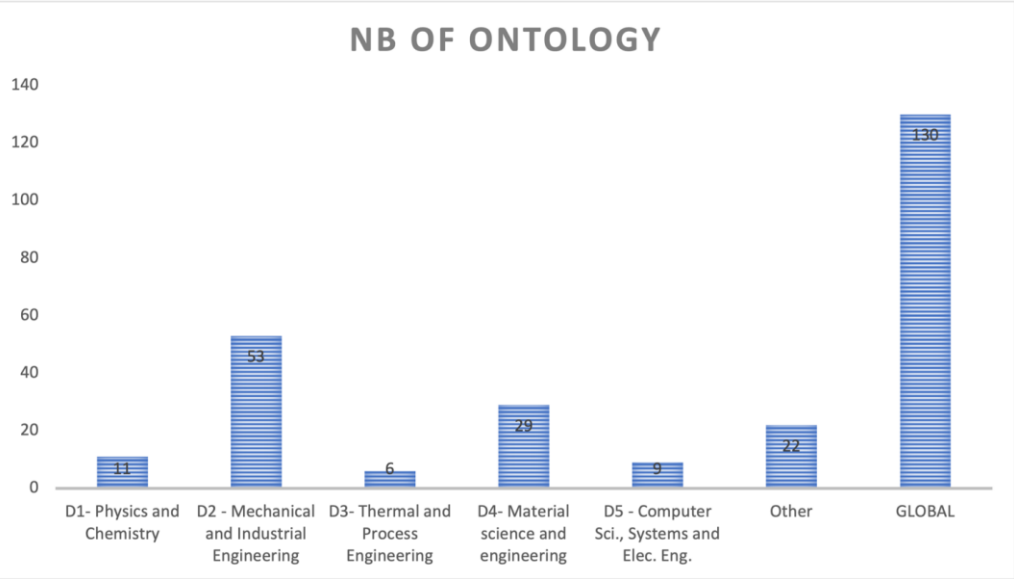


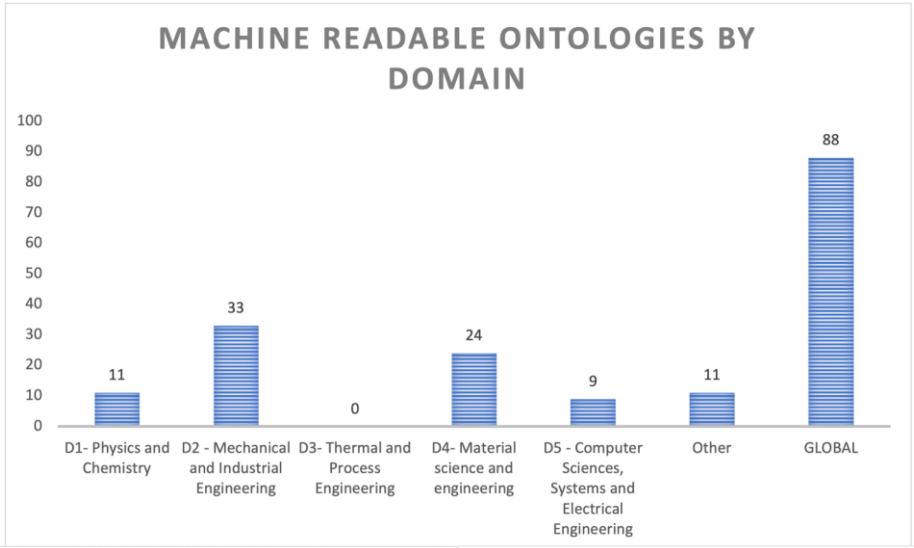
Intra-ontology interoperability **:** The capability to enable data sharing between a single semantic representation of data from TLO to ALO coming from *a monistic ontology/domain approach* (one-to-one exclusive relation between ontology and domain of interest). This type of interoperability will be addressed by OntoCommons within a TLO ontology branch whose lower ontology levels share a common semantic framework.

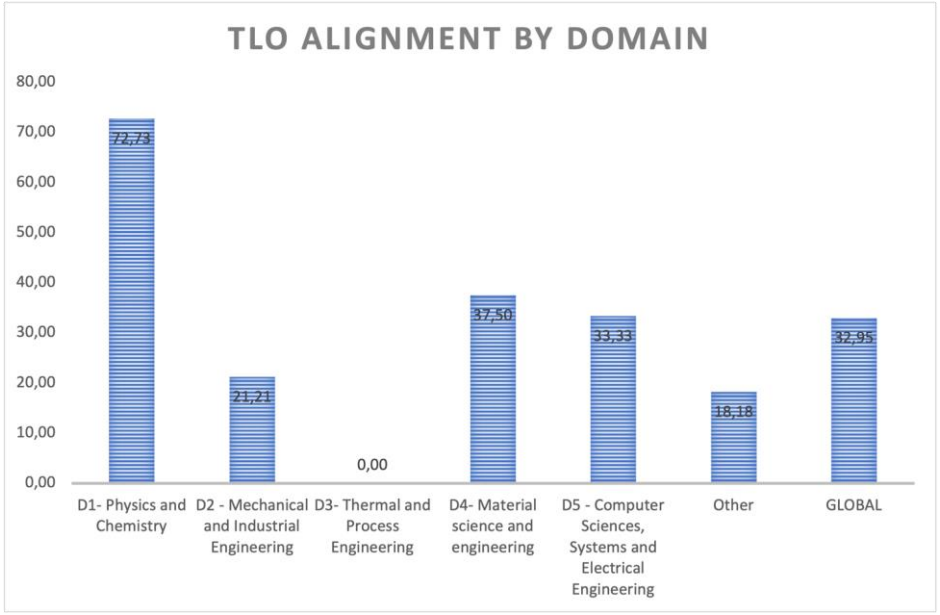
Cross-ontology interoperability the capability to enable data sharing between different semantic representations of data from different TLOs branches coming from a *pluralistic ontology/domain approach*.

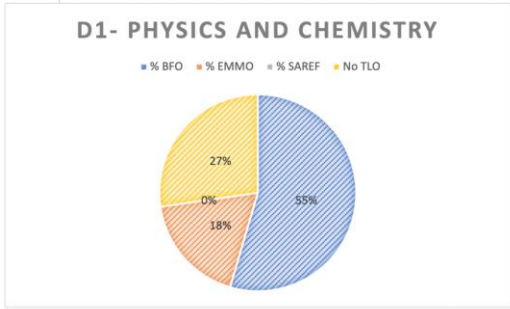
DLO Analysis

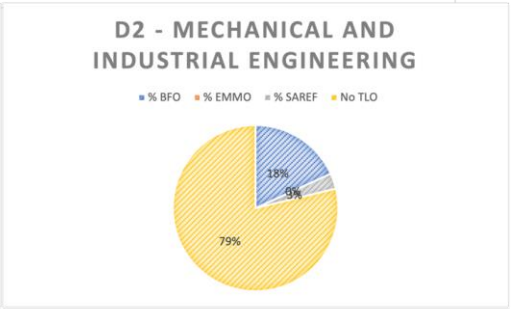
https://data.ontocommons.linkeddata.es/index
www.matportal.org/
www.industryportal.enit.fr/

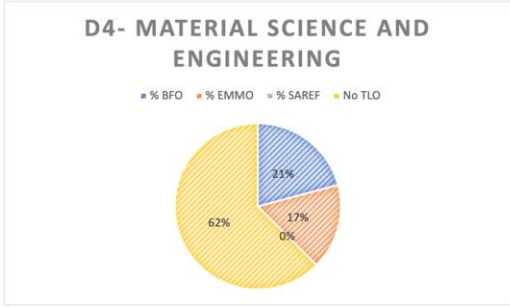


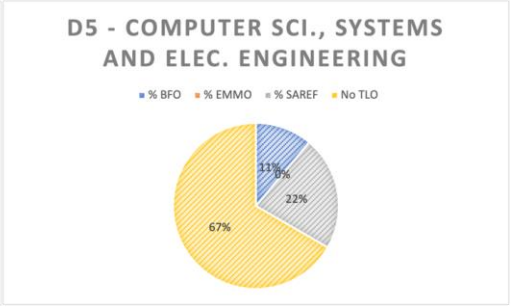












FAIRness of the landscape

Domain	FAIR Score	Global FAIR Score	FOOPS! score
Physics and Chemistry	34.7% (±13.7%)	42.7% (±8.7%)	37.3% (± 11.7%)
Mechanical and Industrial Engineering	18.8 % (±14.4%)	27.8 % (±11.8%)	24.6% (±19.29%)
Materials Science and Engineering	28.8% (±21.3%)	40.8% (±16.2%)	28.9% (±14.35%)
Computer Science, Systems and Electrical Engineering	31.25% (±7.2%)	38.5% (±6.3)	43.25 (±30.6%)

- The “FAIRest” ontology is the Allotrope Ontology which is the only ontology tracking provenance using PROV.
- no ontology is totally compliant with the FAIR
- only 6 ontologies over 44 have a score that is more or equal to 50%

Methodology

OntoCommons project is built consistently around the a **develop-test-validate-agree** methodology organized in six subsequent phases.

STAKEHOLDER NETWORKING

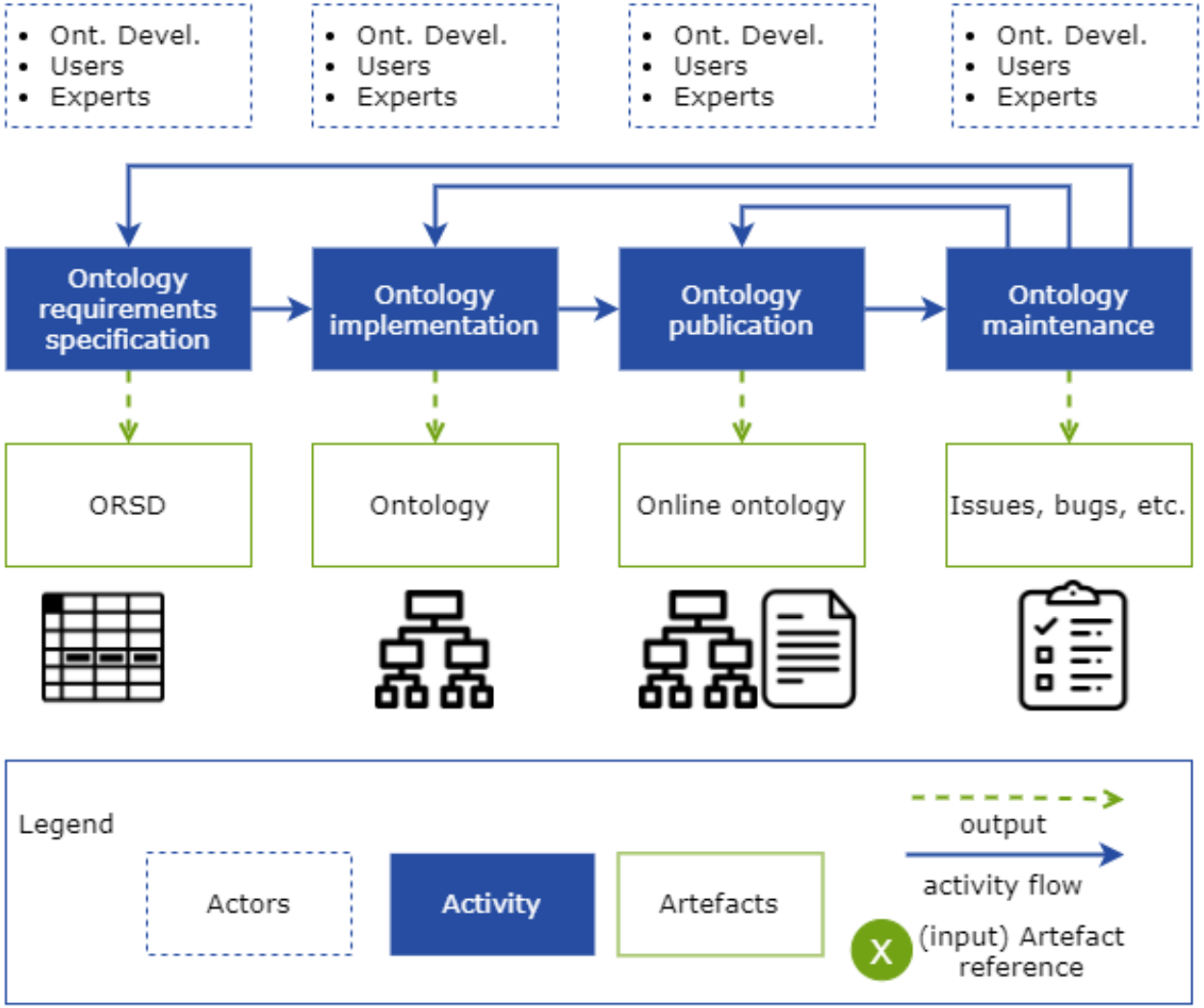
TRO and DLO DEVELOPMENT (INCLUDING COMMUNITY FEEDBACK)

DEMONSTRATION

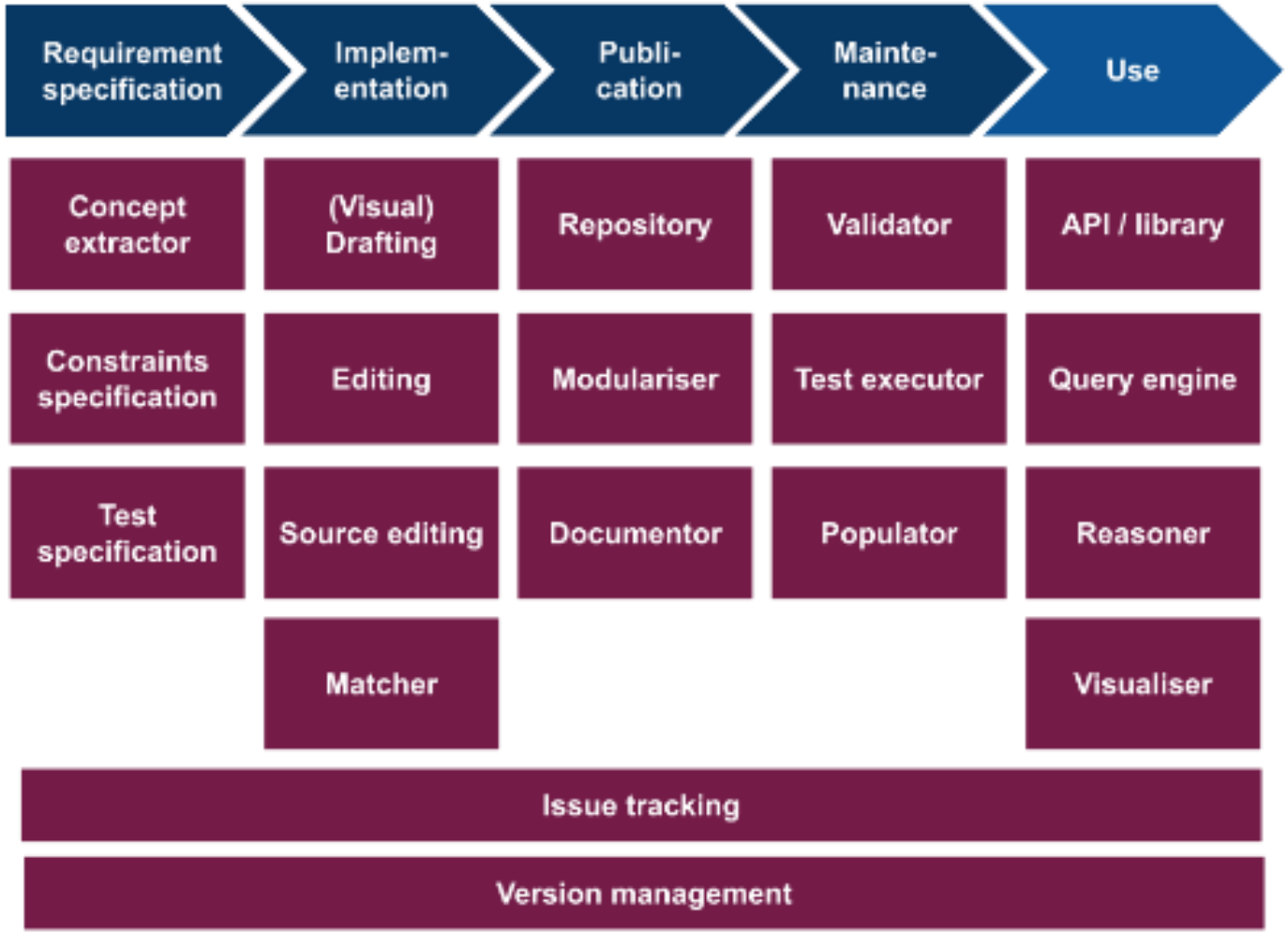
Expected impacts

- **Standardised** and operational **intra- and cross-domain data documentation** that meets the FAIR data principles
- Enable a mechanism to allow **practical and user-friendly re-usability of data** across domains and industrial sectors
- Enable a **maintained and continuously developed ontology and data documentation** to ensure long-term relevance and implementation
- Facilitate **uptake of new project results** by Making tools available that ensure practicality and user friendliness
- Improve ability to build **interoperable software solutions** in materials, process and manufacturing

LOT Methodology



Components of the ontology ecosystem toolkit



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OntoCommons Outputs

ONTO COMMONS TOOLS & SOLUTIONS

OntoCommons Ontology EcoSystem (OCES)

- A hierarchy of ontologies
- Toolkits
- Specifications
- OntoCommons Top Reference Ontology (TRO)
- Top Level Ontology (TLO)
- Domain Level Ontology (DLO)
- Application Level Ontology (ALO)
- Blueprinting reference implementation Toolkit
- OntoCommons Ontology Repository
- Ontology ecosystem knowledge graph

METHODOLOGICAL FRAMEWORK & ECOSYSTEM

- Methodological framework for ontology development and documentation
- Ontology ecosystem structure and reference implementation

REPORTS

- Data Management Plan
- Communities interested in domain-specific semantics
- Domains ontology requirements and specifications
- Feedback loops of cross domain ontologies interoperability
- The finalized Review of Domain Interoperability (RoDI)
- Dissemination, communication & stakeholder's engagement strategy & plan
- Exploitation & Sustainability
- Landscape of ontology development methodologies and platforms
- OntoCommons Standardisation Impact Report

EVENTS

2 DOMAIN ONTOLOGIES
2 HORIZONTAL WORKSHOPS
8 FOCUSED WORKSHOPS
2 EXPERT GROUP MEETINGS
3 EXTERNAL ADVISORY BOARD
6 SUPPORT WEBINARS

COMMUNITY

AN AUTHORITATIVE & ACTIVE EXTERNAL ADVISORY BOARD (EAB)

2,000 ENGAGED COMMUNITY MEMBERS FROM ALL STAKEHOLDER GROUPS & GLOBAL COVERAGE

PRESENCE AT **>30** 3RD PARTY EVENTS

DEMONSTRATORS

Use of Ontologies

- Airbus, Materials
- Bosch, Manufacturing of Microchips
- Aibel, Material, automated reasoning
- Teckniker, material, search and decision
- BASF, Material
- OAS, PSS on logistic and manufacturing, decision making
- IFAM, Material, quality management
- Manufacturing or chemical industry
- Holonix, Product life cycle management, manufacturing
- IRES, Nanosafety, manufacturing, decision making
- Adige SpA, Manufacturing, remote maintenance process

ONTOCOMMONS ROADMAP

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Thanks

Questions?

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Contact

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