

Aspects of data interoperability via ontologies in DOME 4.0 and OntoCommons projects

Silvia Chiacchiera^{[1][*]}, Noel Vizcaino^[1], Martin T. Horsch^[2,1], Michael Seaton^[1], Ilian Todorov^[1]

[1] UK Research and Innovation, STFC Daresbury Laboratory, Scientific Computing Department, Keckwick Ln, Daresbury WA4 4AD, UK

[2] Norwegian University of Life Sciences, Faculty of Science and Technology, Department of Data Science, Drøbakveien 31, 1430 Ås, Norway

DOME 4.0: Digital Open Marketplace Ecosystem 4.0



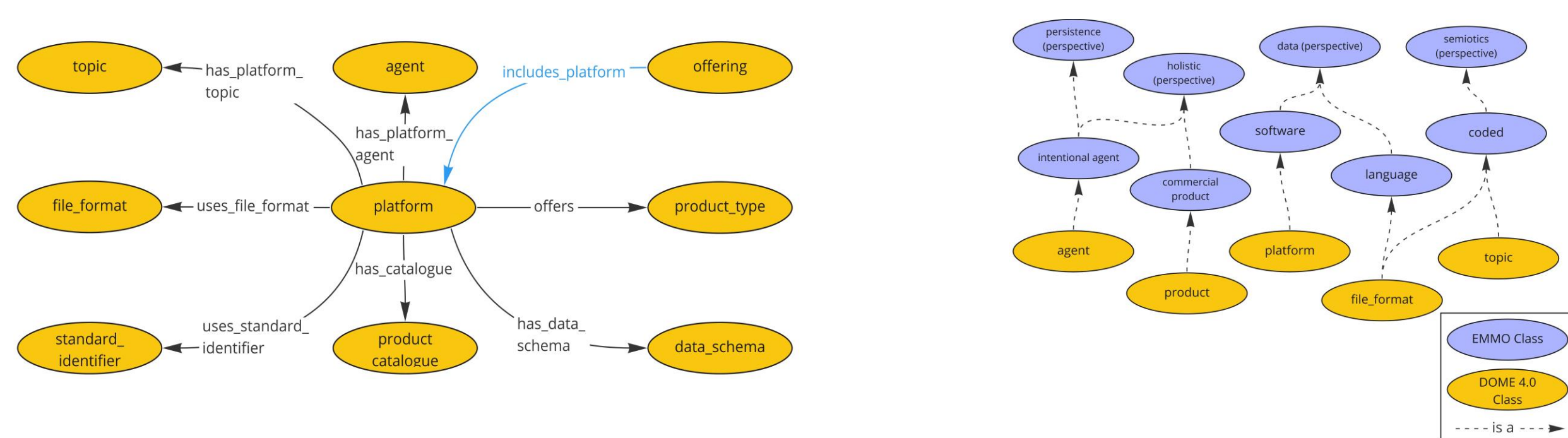
Timeline: Dec 2020 - Dec 2024
GA number: 953163
Coordinator: Amit Bhawe (Computational Modelling Cambridge Limited – CMCL, UK)
Website: <https://dome40.eu/>

1. The project in a nutshell

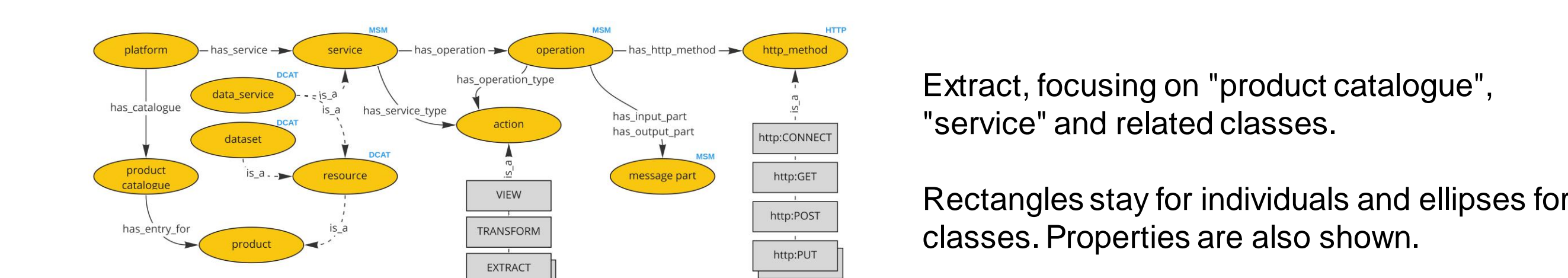
What? An H2020 project to build a **semantic industrial data ecosystem**, for data sharing and knowledge creation across the materials-to-manufacturing value chain.
For whom? Data consumers and providers in **materials and manufacturing**.
Main result: The DOME 4.0 **digital marketplace platform**.
UKRI main role: Contribution to semantic interfaces and a use-case on formulations.

2. Ontology-driven interfaces. Ecosystem Ontology

The aim of the **Ecosystem Ontology** [1] is to provide a light formal vocabulary to support the **integration of multiple web-based sources of data and services**, in the area of materials and manufacturing. It includes concepts such as: platform, catalogue, dataset, service, topic, and offering (cf. figure left), and is aligned to the EMMO [2]. It complements the **Semantic Data Exchange Ontology** [3], where concepts from DCAT [4] are mapped to the richer framework of EMMO.
Use: The Ecosystem Ontology is used by core components of the DOME 4.0 platform, as the **front-end** user interface (e.g., the available filtering options and fields for registration), the **semantic broker**, and **connectors** to other platforms.
Connection to other assets: Whenever possible, pre-existing assets, including formal semantic artefacts and standard knowledge sources (e.g., books) have been re-used, including: EuroSciVoc, RoMM, DCAT, MSM, EVMPO and the FAIRsharing Data formats catalogue (for details and references, see [1]).



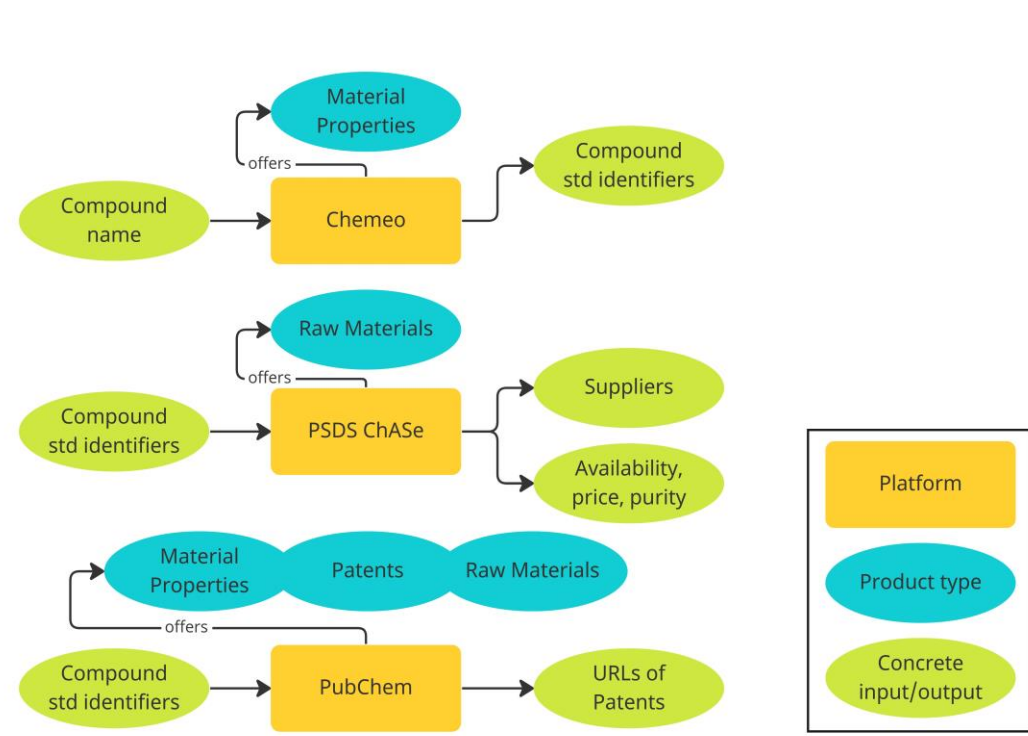
Left: Selection of classes from the DOME 4.0 Ecosystem Ontology. Right: Selection of alignments to EMMO classes.



Extract, focusing on "product catalogue", "service" and related classes.

Rectangles stay for individuals and ellipses for classes. Properties are also shown.

3. A use-case on data integration for formulated goods



Data integration for formulations. Concepts from the Ecosystem Ontology are used.

Idea: Support the **integration of multiple data/service sources** on formulations. Systems are in the fluid phase, usually involving solvents, surfactants, and salts. The main data sources (below) and typical input/output are shown (left).

- Cheméo [<https://www.chemeo.com/>]
- PSDS ChASe: Chemical Availability Search from the (UK) Physical Sciences Data-Science Service (PSDS). [<https://www.psd.ac.uk/>]
- PubChem [<https://pubchem.ncbi.nlm.nih.gov/>]

OntoCommons: Ontology-driven data documentation for Industry Commons



Timeline: Nov 2020 - Nov 2023
GA number: 958371
Coordinator: Nadja Adamovic (Technische Universitaet - TU Wien, Austria)
Website: <https://www.ontocommons.eu/>

1. The project in a nutshell

What? OntoCommons (OC) is an H2020 Collaboration and Support Action (CSA) project for the **standardization of data documentation** across all domains related to **materials and manufacturing**.
For whom? Ontologists, data scientists, material scientists, industrial end-users.
Main results: The Ontology Commons EcoSystem (OCES), a set of ontologies and tools that follows specific standardization rules. The OC Roadmap [5].
UKRI main role: Currently, leading the development of RoDI (see below).
Next event: OC 2nd **Global Workshop**, 13-16 June 2023, Oslo (Norway) and on-line.

2. The Review of Domain Interoperability (RoDI)

Scope: All aspects of interoperability, with a focus on semantic interoperability.
Aim and target audience: Provide guidance (recommendations and solutions) to developers (at domain level) of ontologies and tools/components that use them.
Ongoing work: Collection and analysis of **references, initiatives, recommendations**. Gathering input from OC and wider community. Three working groups: **Terminology & Classifications** of interoperability, **Technical components** to support interoperability; Interoperability **scenarios**.

Example classification: Technical, semantic, and organizational (including legal) interoperability.

Example initiative: Data Documentation Initiative Cross-Domain Integration

Example technical component: Mappings. A concrete implementation: A Simple Standard for Sharing Ontological Mappings (SSSOM) [6].

3. We need your input and feedback!

In particular we need your input and feedback on RoDI on the OC Roadmap.

How to contribute to RoDI: please contact us and participate in the dedicated session in the OC Global Workshop. We look for pointers to technical solutions, methods and classifications of interoperability.

How to contribute to the OC Roadmap: on-line surveys are available (<https://ontocommons.eu/roadmap>), organized by the major topics addressed.

References & Other acronyms

- [1] S. Chiacchiera *et al.*, DOME 4.0 Deliverable 3.2, "Ecosystem Information Model Ontology", November 2022. (Available on DOME 4.0 website)
- [2] E. Ghedin *et al.*, Elementary Multiperspective Material Ontology (EMMO). Repository: <https://github.com/emmo-repo/EMMO>
- [3] E. Ghedin *et al.*, DOME 4.0 Deliverable 3.1, "Semantic Data Exchange Ontology", February 2022. (Available on DOME 4.0 website)
- [4] Data Catalog Vocabulary (DCAT), <https://www.w3.org/TR/vocab-dcat-2/>.
- [5] N. Adamovic *et al.*, "OntoCommons RoadMap v1", April 2022, <https://doi.org/10.5281/zenodo.7544508>.
- [6] N. Matenzoglu *et al.*, SSSOM, Database, Volume 2022, baac035, 2022.

EuroSciVoc: The European Science Vocabulary; RoMM: Review of Materials Modelling; MSM: Minimal Service Model; EVMPO: European Virtual Marketplace Ontology.

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